

Environmental Resource Inventory Borough of Lindenwold

**May 12, 2010
Rev. June 21, 2010**

Borough of Lindenwold, Camden County, New Jersey
Prepared by Environmental Resolutions, Inc.

Lindenwold Environmental Commission



Photo by Bodine



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Acknowledgements

Borough of Lindenwold

Frank DeLucca, Mayor

Dawn Thompson, BA, CFO

Nancy DiDomenico, Secretary

Robert Lodovici, Superintendent of Public Works

Borough of Lindenwold Environmental Commission

Beth Suckiel - Chairperson

Nancy Lutz – Vice-Chairperson

Ken Balmer – Council Representative

Joe DiDomenico

Jeanette Krug

Al Tine

Anthony Stankiewicz

Bill Bodine – Photographs

Prepared by



Environmental Resolutions, Inc

Association of New Jersey Environmental Commissions (ANJEC)

Kerry Miller, Assistant Director

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from the

Association of New Jersey Environmental Commissions (ANJEC)

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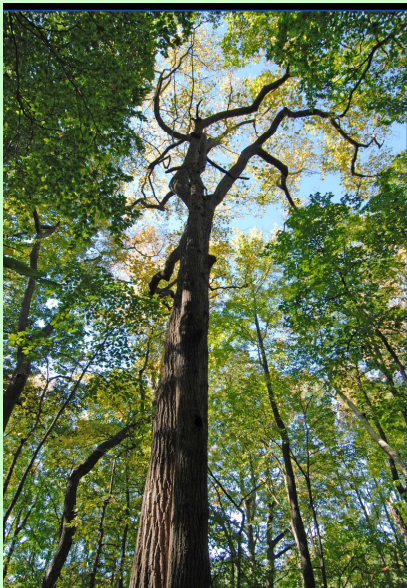


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SECTION I. INTRODUCTION

A. Basis for Environmental Resource Inventory

Two New Jersey state laws give environmental commissions the authority and responsibility for conducting an Environmental Resource Inventory (ERI). The first law is The Environmental Commission Enabling Legislation (N.J.S.A. 40:56A) which states:

“A...commission organized under this act shall have power to conduct research into the use and possible use of the open land areas of the municipality.... It shall keep an index of all open marshlands, swamps and other wetlands, in order to obtain information on the proper use of such areas, and may from time to time recommend to the planning board, or, if none, to the mayor and governing body of the municipality, plans and programs for inclusion in a



Photo 1, Eastern Painted Turtle, Bodine

municipal master plan and the development and use of such areas.”

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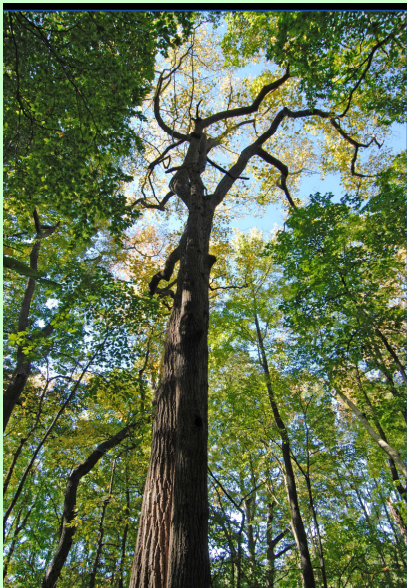
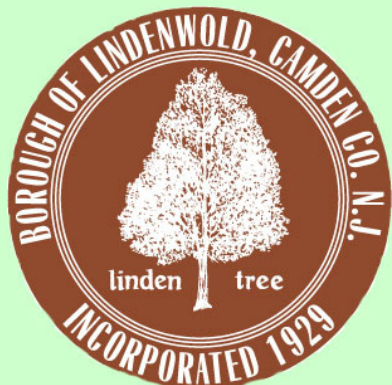


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The second law is Municipal Land Use Law (MLUL) (N.J.S.A.40:55D-1 et seq.), which requires municipalities to have a land use plan element in their master plan, "including but not necessarily limited to, topography, soil conditions, water supply, drainage, flood plain areas, marshes, and woodlands...." (The ERI, ANJEC)

B. Goal of the Natural Resource Inventory

The Association of New Jersey Environmental Commissions (ANJEC) defines an Environmental Resource Inventory as follows:

"The Environmental Resource Inventory (ERI), also called Natural Resource Inventory (NRI), or Index of Natural Resources, is a compilation of text and visual information about the natural resource characteristics and environmental features of an area. An ERI is an unbiased report of integrated data. It provides baseline documentation for measuring and evaluating resource protection issues. The ERI is an objective listing, rather than an interpretation or recommendation. Identifying



Photo 2, Dragonfly, Photo by Bodine

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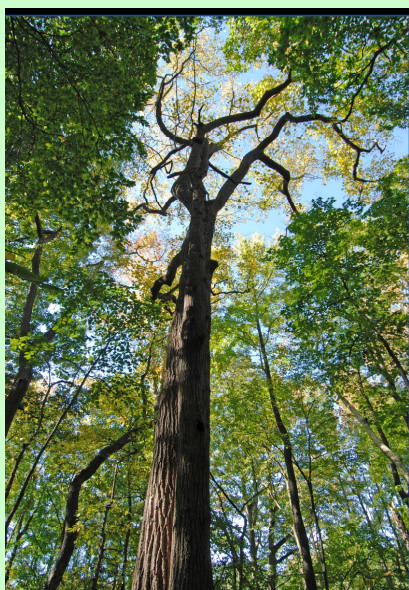


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significant environmental resources is the first step in their protection and preservation." (The ERI, ANJEC)

The goal of the Environmental Resource Inventory is to create a tool that increases the understanding of the natural systems within the municipal boundaries, shows how much land is set aside for open space, aids in the land use planning process, aids the site plan review process, assists in the development of municipal ordinances, and identifies natural resource areas to be protected. The ERI will principally be used by the Planning Board, Zoning Board of Adjustment and Environmental Commission, and will provide valuable information to anyone interested in the natural resources of the Borough of Lindenwold.

The Environmental Resource Inventory will be made available to the residents of the Borough through the Borough website and will provide a valuable public educational tool that can be easily accessed and available for many types of uses. The environmental resource maps that are created can be used by Borough residents to understand their municipality. In any format the ERI document can engage residents in environmental issues and activities within the Borough, such as the volunteer clean-ups held at Lindenwold parks and lakes.

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Photo by Bodine



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C. Limitations of the ERI

It should be noted that the ERI is not intended to produce original research and is not meant to replace the primary data sources upon which it is based. It is not intended for preliminary assessments of development projects and cannot substitute for on-site testing and evaluations.



Linden Tree,
www.nysite.com/nature/flora/page/basswd1

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Photo by ERI, Inc



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SECTION II. OVERVIEW

A. Population

Lindenwold Borough, located in Camden County, New Jersey, is a stable municipality with a year 2000 census population of 17,414 residents and a land area of 4.6 square miles or 2,944 acres of land. The Borough has limited expectation of additional residential development as most remaining large tracts of land not presently developed have considerable environmental constraints.

Four areas within the Borough have been approved for redevelopment as identified in the October 29, 2007 re-examination of the Land Use Element of

the Masterplan. [6]

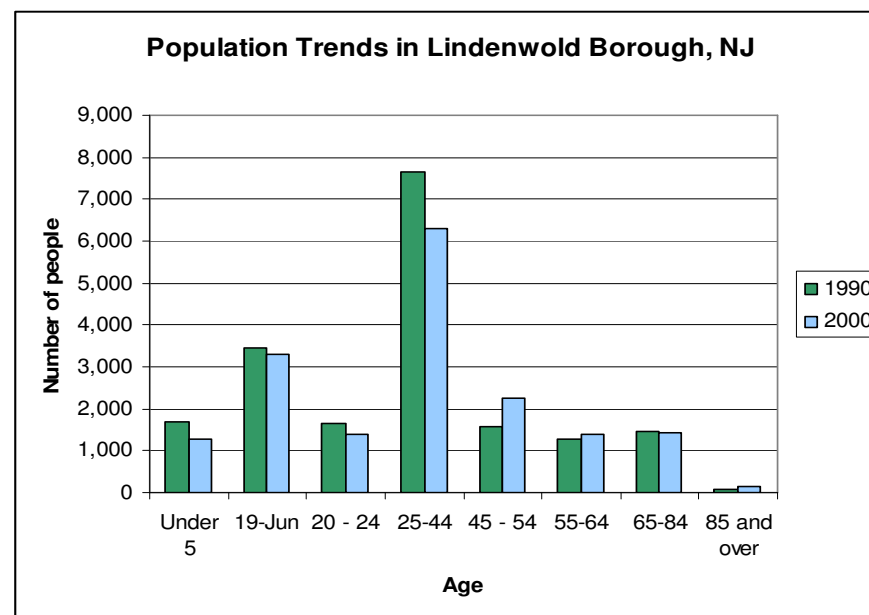


Figure 1. Population Trends in Lindenwold Borough, NJ

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Photo by ERI, Inc



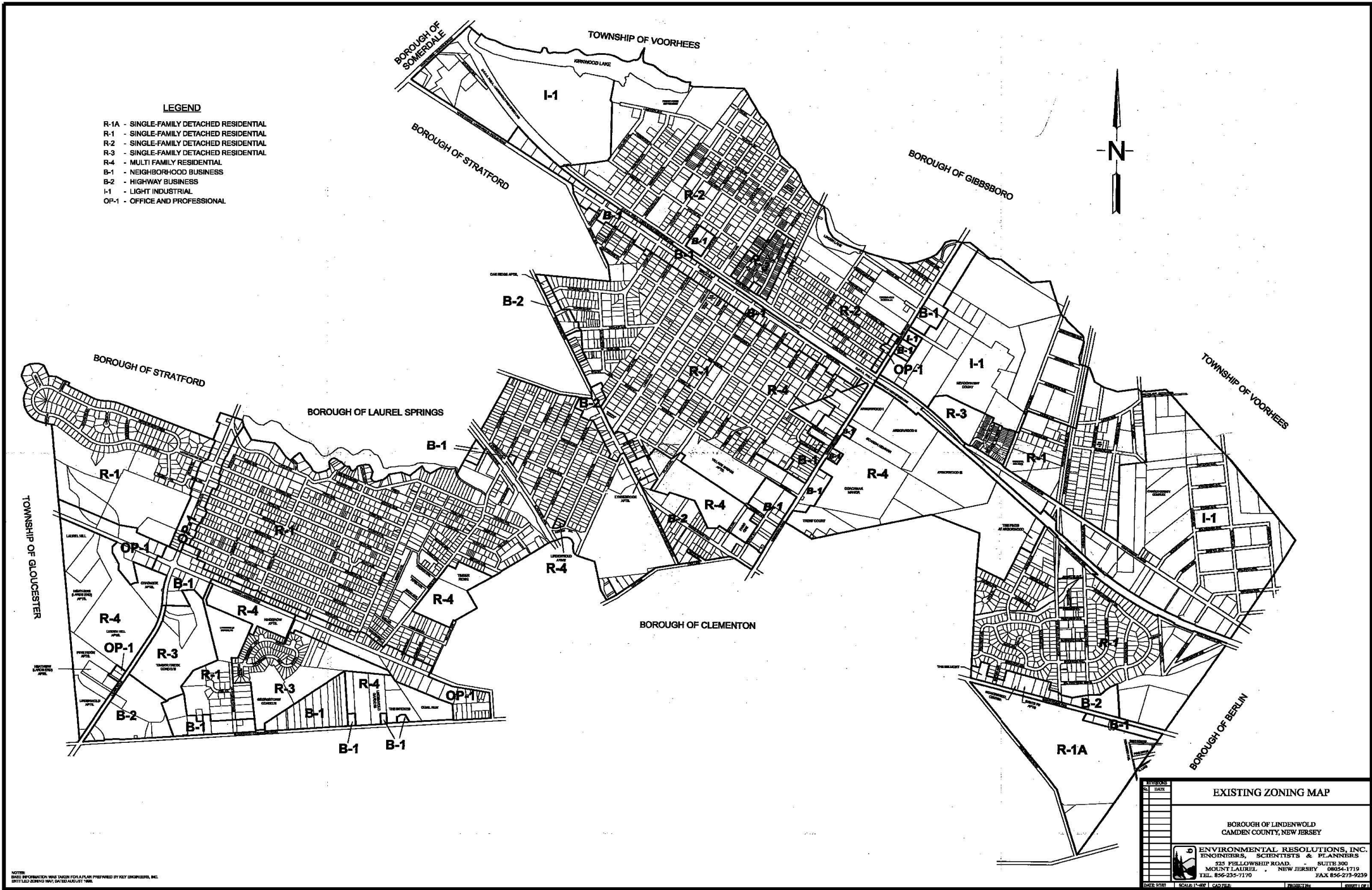
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Table 1. Population Trends in Lindenwold Borough, NJ

	1990		2000	
Under 5	1,689	9.0%	1,258	7.2%
6 - 19	3,462	18.4%	3,285	18.9%
20 - 24	1,637	8.7%	1,385	8.0%
25-44	7,651	40.7%	6,301	36.2%
45 - 54	1,578	8.4%	2,268	13.0%
55-64	1,261	6.7%	1,378	7.9%
65-84	1,471	7.8%	1,407	8.1%
85 and over	71	0.4%	132	0.8%
TOTAL	18,820	100%	17,414	100%
Median Age	29.9		33.3	
Under 18	4,317	22.9%	4,115	23.6%
65 and over	1,542	8.2%	1,539	8.8%

One redevelopment area, identified as Linden Lake, has been redeveloped with the construction of Linden Lake Senior Housing, with patio homes still to be constructed on Roosevelt Avenue. The redevelopment of the Gibbsboro Road Apartment corridor and the Transit Village Development District could result in a change to the Borough population in the future.

FIGURE 2 – BOROUGH ZONING MAP



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Photo by Becica



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B. Parks and Recreation

Tables 2 through 5 present an inventory of open space, parklands and recreational facilities within the municipal borders of Lindenwold Borough.

Table 2 Borough Owned Park Facilities

Map #	Park Name	Size (Ac)	Location	Usage
BP1	Lindenwold Park*	55	United States Ave.	Regional/Community Park
BP2	Carlton Rouh Memorial Fields*	6	Egg Harbor Rd.	Community Park
BP3	Holland St. Park	2	Holland St.	Neighborhood Park
BP4	Winthrop Park	0.45	Winthrop Ave.	Pocket Park
BP5	Emerson St. Park	3.25	Emerson St. & Cedar Ave.	Neighborhood Park
BP6	Whitman Ave.	1	Whitman Ave. & Lincoln Ave.	Pocket Park
BP7	Scott Avenue	8.18	Scott Ave. & 4 th Ave.	Pocket/Passive Open Space
BP8	Scout Troop Lodge	0.83	Lake Blvd.	Scouting Facility
BP9	Aston Park	0.39	Aston Martin Dr.	Pocket Park
BP10	Homesite Ave.	0.23	Homesite Ave. & 10 th Ave.	Pocket Park
Total Area (Ac):		77.3	* Estimated area	

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Photo by Becica



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Table 3 Borough Owned Open Space & Conservation Areas

Map #	Name	Size (Ac)	Location	Usage
BC1	Kirkwood Lake Area	49.89	Lakeview Ave.	Passive/Conservation
BC2	Laurel Lake Area (I)	6.36	Lake Blvd.	Passive/Conservation
BC3	Laurel Lake Area (II)	1.00	Lake Blvd.	Conservation
BC4	Crystal Lake Area	3.18	United States Ave.	Conservation
	Total Area (Ac):	60.43		

Table 4 County Owned Open & Conservation Areas

Map #	Name	Size(Ac)	Location	Usage
CC1	Laurel Ravine	50.00	Aston Martin Dr.	Passive/Conservation
CC2	Lake Worth Park	54.15	White Horse Pk.	Passive/Conservation
	Total Area (Ac):	104.15		

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Photo by Becica



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Table 5 Board of Education Facilities

Map #	Name	Size(Ac)	Location	Usage
EF1	Lindenwold High School	20.00	Egg Harbor Rd.	Regional/Community Park
EF2	School 4	11.96	Gibbsboro Rd.	Neighborhood Park
EF3	Middle School	30.34	White Horse & Elm Ave.	Regional/Community Park
EF4	School 5	10.62	Chews Landing Rd.	Neighborhood Park
	Total Area (Ac):	72.92		



Photo 3, Lindenwold Middle School, special camera angle,, Bodine

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SECTION III. HISTORY OF LINDENWOLD

A. Formation of the Borough of Lindenwold

Lindenwold was originally part of Clementon Township. However, due to an expanding population the government began to falter and in 1924, when school and road bills failed to be passed, Clementon, Stratford, Somerdale and Lindenwold pushed for separate governments. The township was eventually split up into Clementon, Lindenwold, Pine Hill, Pine Valley, Somerdale and Hi-Nella. The Borough of Lindenwold was created on April 23rd, 1929. It is comprised of eleven sections:

- 1) The Overbrook section
- 2) The Norcross Tract
- 3) The Lucaston Section
- 4) The Hill Tract
- 5) Fox's Corners or Brownsville Section
- 6) The Kirkwood Section
- 7) The Watsontown Section
- 8) Laurel Mills Section
- 9) The Garden Lake Section
- 10) The North Clementon Section
- 11) The Amber Terrace Section

According to the town's "History of Lindenwold" book, Lindenwold was "plotted" on November 21, 1885 when it was still part of Gloucester Township. It was during this time that Wimer Bedford, Secretary and

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Attorney for the Penn Guarantee Trust Co. named the area. The name "Lindenwold" is German in origin and means "Linden Woods". This refers now to the rolling upland hills as on Egg Harbor Road as it approaches Berlin past the Lucaston section of town. Linden trees, which are large shade trees also known as basswoods, were supposed to be planted in town, but while Bedford was out of town on business, the local government planted cheaper trees instead. In 1924 Clementon, Lindenwold, Stratford, and Somerdale pushed for separate governments and on April 23, 1929 Lindenwold became a Borough. [6,8]

Source: Jeanette Krug and History of Lindenwold

The Borough is governed by a mayor and six council persons. It has a police force, volunteer fire department, four public schools, a high school, seven churches, one mega church, and over 100 miles of streets and roads. As shown in Figure 2, the Borough Zoning Map, the Borough shares borders with ten municipalities:

- | | |
|------------------------|--------------------|
| 1) Gloucester Township | 6) Berlin Borough |
| 2) Pine Hill | 7) Berlin Township |
| 3) Clementon | 8) Somerdale |
| 4) Gibbsboro | 9) Voorhees |
| 5) Laurel Springs | 10) Stratford |

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Photo by Becica



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Figure 4 shows aerial photographs of Lindenwold and the surrounding communities taken in 2000. It can be seen that Lindenwold and the local areas around Lindenwold are predominantly residential communities. The multi-family buildings can be seen in the aerial as the larger buildings grouped in clusters. Large lakes and streams appear as dark areas on the aerial. The commercial development with larger parking lots can be located along the White Horse Pike (U.S. Rt. 30).

The position of Lindenwold is 39.824°N 72.998°W with an elevation of 95 feet above sea level.

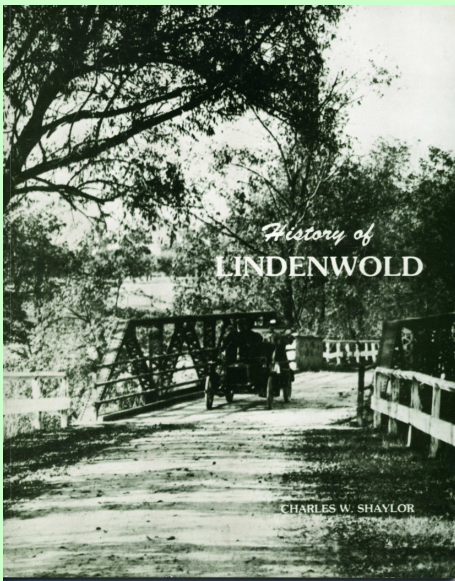


Photo 4, 4th Avenue – Residential R-1 Zone, Becica

FIGURE 4 – AERIAL PHOTOGRAPH OF LINDENWOLD AND SURROUNDING COMMUNITIES



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By Charles W. Shaylor



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B. History of Lakes and Streams by Joe DiDomenico

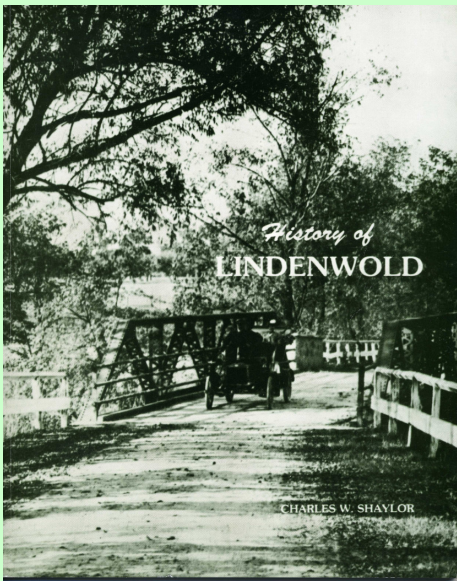
Overbrook Lake. Overbrook Lake is formed from a former marl pit that has been inactive since 1877. The lake is the result of an impoundment of the Big Timber Creek system and is currently held up by a spillway structure that was built in 1940. The lake is located behind the



Lindenwold Middle School
Photo 5, Overbrook Lake, Bodine
between the White Horse Pike (Rt. 30) and Elm Avenue.

Laurel Lake. Laurel Lake is located along the border of Lindenwold Borough and Laurel Springs Borough. The lake is bordered to the north by Laurel Springs, to the south by Lake Boulevard in Lindenwold, and to the west by Laurel Road (County Route 673). The lake is approximately fourteen (14) acres in surface area and is formed by an impoundment of the Big Timber Creek system. The lake was originally created by a grist mill

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By Charles W. Shaylor



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in the same general location as the current dam located on the western side of Laurel Road in the Borough of Stratford. Laurel Lake is also fed by several natural springs. The most famous natural spring is Crystal Spring located in Laurel Springs on the northeast side of the lake. There is no public access to Laurel Lake in the Borough of Lindenwold.

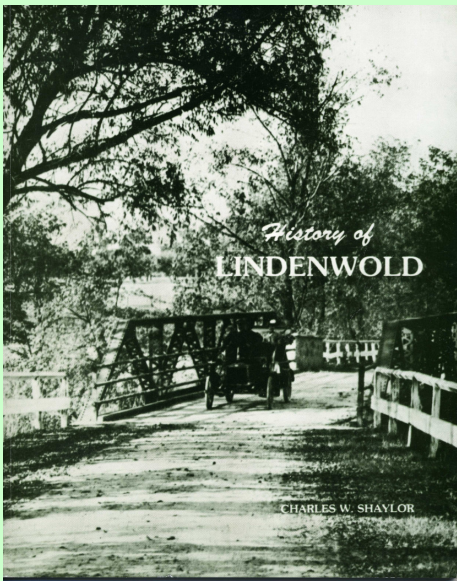
Talberts Lake. Talberts Lake is located near the southern tip of Gibbsboro at the head of the south branch of Cooper creek, just north of Aston Avenue off United States Avenue.

Pine Lake. Pine Lake located across White Horse Pike from Lindenwold Middle School. It was a popular swimming and picnic area before the construction of a residential development.

Kirkwood Lake. Kirkwood Lake is located along the border of the Borough of Lindenwold and the Township of Voorhees. The lake is east of White Horse Road (County Route 673), south of Gibbsboro Road, and just north of the Lindenwold PATCO train station. The lake is approximately fourteen (14) acres in surface area and is an impoundment of the Cooper River system.

Kirkwood Lake is also formed from a inactive marl pit. Because of this, Marl City was going to be the name of the city instead of Kirkwood.

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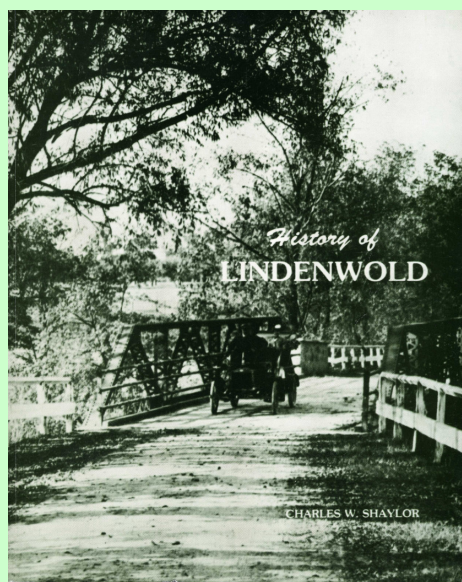
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However, it was decided that Marl City was not marketable and not beneficial to economic development. In the early 1900's Kirkwood Lake became a sizable resort, attracting city dwellers who arrived by train at Kirkwood station. Vacationers rented cottages around the lake. During this time the "Knickerbocker Ice Company" used the lake as a source for ice for both commercial and household refrigeration purposes in the Borough and the surrounding communities. The Kirkwood Lake Dam which was set to keep the lake at a depth of 9 feet, 3 inches was also used to power the local gristmill.

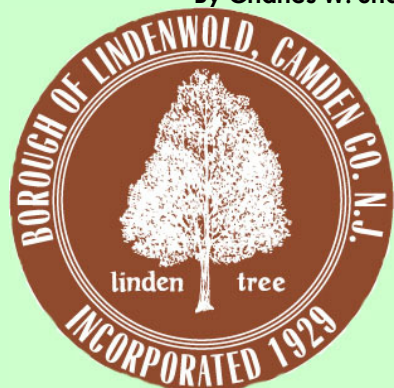
Linden Lake. Linden Lake is located between Gibbsboro and Lindenwold. It is an enlargement of South Branch Cooper Creek and runs between Norcross and Central Streets. Linden Lakes Senior Housing was recently built between Roosevelt Avenue and Linden Lake where the Borough sewage treatment plant once stood.

Lake Worth. Lake Worth mistakenly called Haines Lake is located at the Berlin Borough line on a tributary of Trout Run and bridged by Watsontown-New Freedom Road. It is located between Watsontown and Sharps corner. It was a very popular swimming and picnic area. The lake and the surrounding 54 acres is owned by Camden County.

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By Charles W. Shaylor



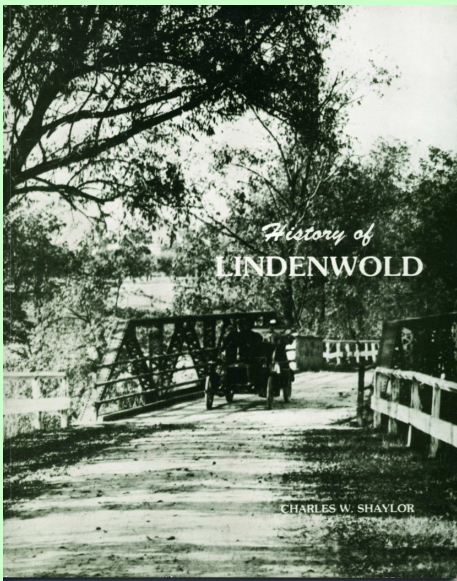
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The “Indian Steps” – The “Indian Steps” are located at the crossing of the tributary of the Big Timber Creek between Overbrook Lake and Laurel Lake as it travels under East Atlantic Avenue and the New Jersey transit rail line in the vicinity of the intersection of Wallace Avenue and West Atlantic Avenue. The name of the “Indian Steps” may have originated during the early 1900s when the Laurel Mills School building was being used as a movie prop by the Lubin Moving Picture Company of Philadelphia. Some scenes in the movie were shot at Laurel Lake where an Indian village had been erected. After that, the area has always been known as the “Indian Steps.”



Photo 6, “Indian Steps” on North Branch of Big Timber Creek, Becica

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By Charles W. Shaylor



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C. History of the Port Authority Transit Corporation (PATCO) by Anna Marie Lutz

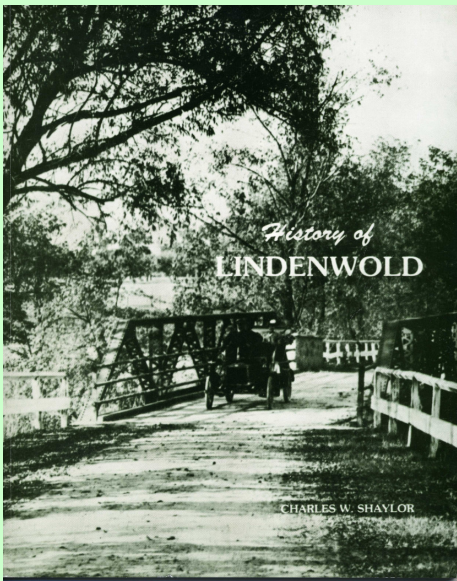
The foundation for the Port Authority Transit Corporation (PATCO) Speedline began in 1926 with the creation of the Delaware River Bridge Commissions and the Construction of the Delaware River Bridge, which is now called the Benjamin Franklin Bridge.



Photo 7, Construction of the Ben Franklin Bridge [7]

When the Delaware River Bridge Commission was reorganized in 1931 as the Delaware River Joint Commission (DRJC), it was given the authority to construct a high speed line between Philadelphia and Camden. On June 7, 1936, the new bridge line opened. Almost twenty years later, the Delaware Port Authority was created by a bi-state contract between Pennsylvania and New Jersey in order to expand the power of the DRJC, which would in turn allow them to construct a more extensive transit line. Although there were several bids for the project, the Delaware Port Authority decided on

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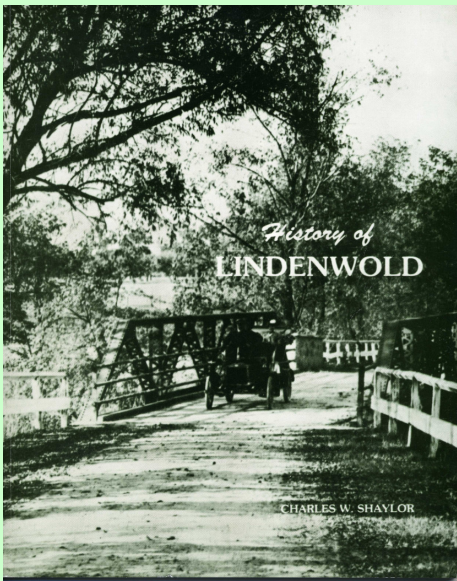
the \$94 million contract that suggested adding the line to the already built rail line on the Ben Franklin and subway connections in Philadelphia.

PATCO began service with eight stations in Camden County, New Jersey and four in Philadelphia, Pennsylvania. Six of the New Jersey stations provided Park and Ride service. In February of 1969, service was extended to Lindenwold, NJ. The first trip from Lindenwold, NJ to Center City in Philadelphia took place on February 15th, 1969. The Lindenwold station connects to not only the PATCO line, but also to the NJ Transit Atlantic City Rail lines. The parking lot accommodates 3,300 vehicles and many additional riders take the NJ Transit bus to get to the Lindenwold station.



Photo 8. Overall Route Map for PATCO [7]

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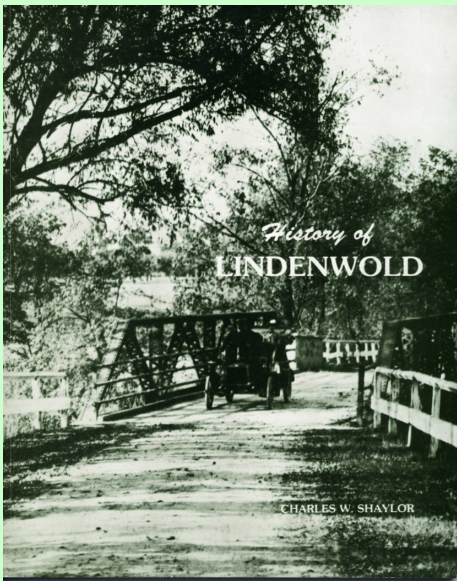


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According to Karen Dougherty from PATCO, on a weekday the Lindenwold station serves an average of 4,700 passengers, an average of 1,700 on Saturday, and an average of 1,100 on Sunday. Over the years, PATCO has grown and so has the region it serves; ridership for the PATCO system in 2009 exceeded 10.3 million riders. Homes, apartment buildings and businesses were all developed along the Speed line, creating tremendous economic and population growth. PATCO also helps reduce air pollution and traffic congestion in South Jersey and Pennsylvania by removing more than 12,500 cars from the roadways each day. As of today, PATCO has thirteen stations and 325 full-time employees, including an award-winning police force. PATCO is currently studying the feasibility of extending service into Gloucester County.

From the creation of the Benjamin Franklin Bridge in 1926 to the opening of PATCO's Speed line in 1969, the Delaware River Joint Commission, now the Delaware River Port Authority has been committed to providing the people of South Jersey and Philadelphia with reliable, quality transportation. [7]

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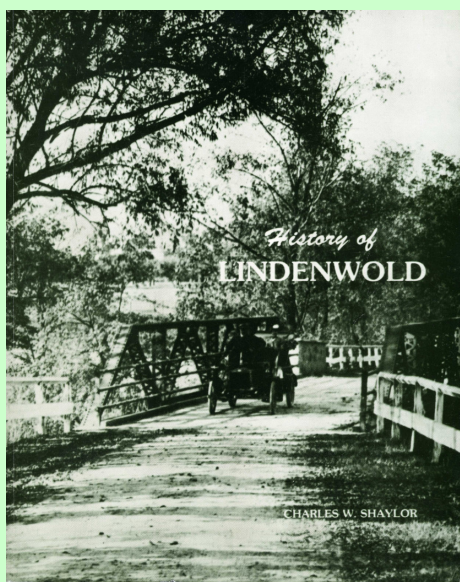
D. History of Multi-Family Apartment Construction by Jeanette Krug

The land within Lindenwold was mostly farmland along with a small airport and several local and commercial and industrial businesses. From 1968 to 1974, John Piper, a real estate developer, approached the Lindenwold public officials for the rights to build in Lindenwold. However, he needed certain zoning changes to be implemented in order to be able to build. Consequently, Mr. Piper paid a total of \$198,500 for favorable treatment and cooperation of the Borough Government and a County Official. After an inquiry by the New Jersey State Commission of Investigation, it was found that abuse of ethical standards and official corruption had occurred. [6]



Photo 9 Coachman Manor Apts, Beca

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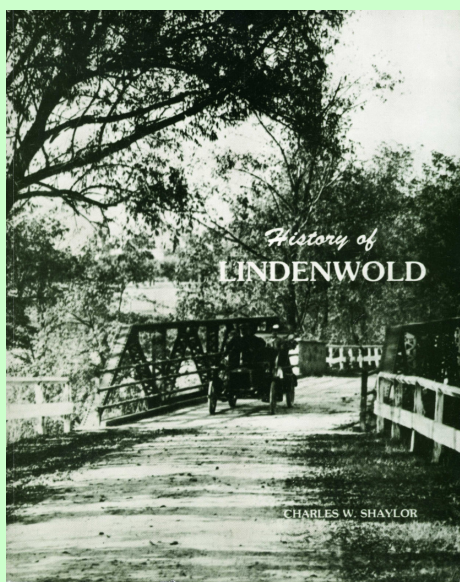
Today, there are twenty-seven apartment complexes in the Borough of Lindenwold. There are a combined total of 5,456 residential units, which are comprised of varying one, two, and three bedroom apartments. The location, density and age of the apartment units impact the quality of life of the Lindenwold residents throughout the Borough. The multi-family developments are shown on the Board of Elections map shown on Figure 5.



Photo 10, Clubhouse at Village Bridge Apts, Becica

Because the apartment complexes provide additional residential housing within the Borough, Lindenwold is more densely populated than

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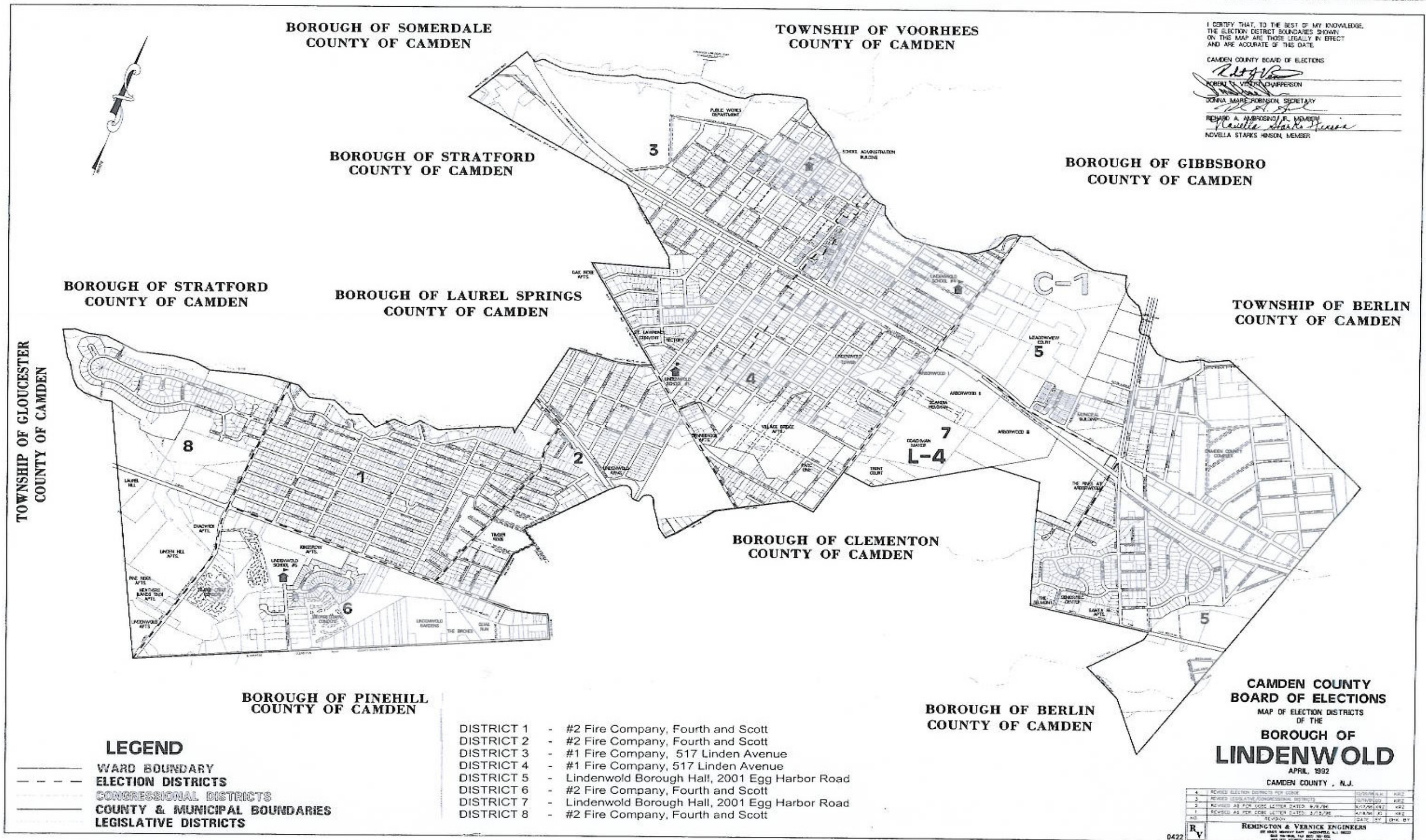
other suburban communities in southern New Jersey, and Lindenwold is positioned as a transit-oriented community. When the apartment complexes along Gibbsboro road were first built, there was a jitney service from the apartments to the PATCO high speed line during commuting hours. Public transportation options include the PATCO High Speed line, NJ Transit bus service, New Jersey Transit train service to Atlantic City and local taxi services.

The public transit options within the Borough along with the options to car-pool or bike to work help give the Borough of Lindenwold real opportunities to reduce fuel consumption, congestion, energy usage and the total carbon foot print of the municipality. [7,6]



Photo 11, PATCO Station, Lindenwold, Becica

FIGURE 5 – BOARD OF ELECTIONS MAP



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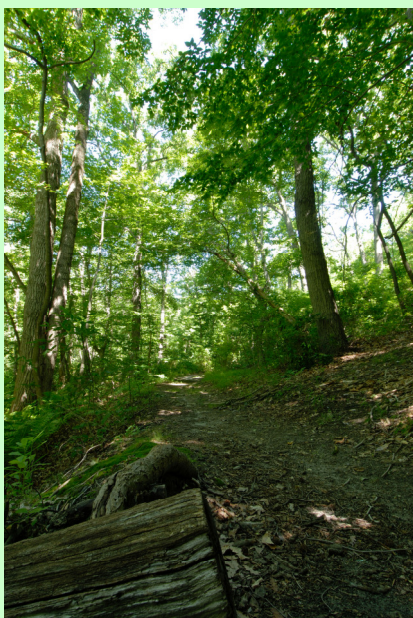


Photo by Bodine



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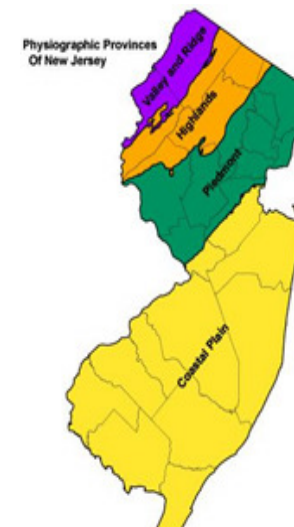
SECTION IV. GENERAL ENVIRONMENTAL CONDITIONS

A. Topography

The Borough of Lindenwold is located entirely within the New Jersey Coastal Plain. The topography of the Coastal Plain generally is flat to very gently undulating. Additionally, erosion-resistant gravel or iron-cemented sediment underlies upland areas and isolated hills.

B. Geology

The Borough of Lindenwold is situated within the New Jersey coastal plain physiographic province, which is primarily characterized by an eastward thickening wedge of unconsolidated sediments. The sediments dip toward the coast and extend beneath the Atlantic Ocean to the edge of the Continental Shelf. The Coastal Plain sediments thicken as you travel southeastward. The sediments consist of layers of sand, silt and clay deposited alternately in deltaic and marine environments because sea levels fluctuated during the Cretaceous and Tertiary Ages. These layers



Physiographic Provinces of New Jersey

Lindenwold Environmental Commission

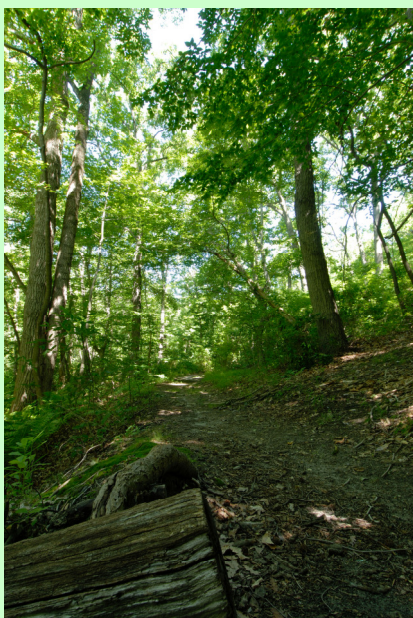


Photo by Bodine



LINDENWOLD BOROUGH

of sediment outcrop in irregular bands that trend northeast-southwest. Wide areas of the Coastal Plain are covered by a thin veneer of Late Tertiary and Quaternary sand and gravel that was deposited by rivers.

Groundwater within the New Jersey coastal plain is located within alternating layers of coarse grained soils (aquifers) and fine grained soils (confining units) as shown on Figure 6. The geology of the soils located within the Borough of Lindenwold is shown on Figure 7. The majority of the municipality is located in the Lower member Kirkwood formation. The geology of the areas on the eastern side of the Borough is the Cohansey formation. The geology of the underlying soils is from the Vincentown formation that follows the Big Timber Creek and Mason Run on the southwestern side of the Borough. [2]

FIGURE 6 - DIAGRAMMATIC HYDROGEOLOGIC SECTION OF THE NEW JERSEY COASTAL PLAIN

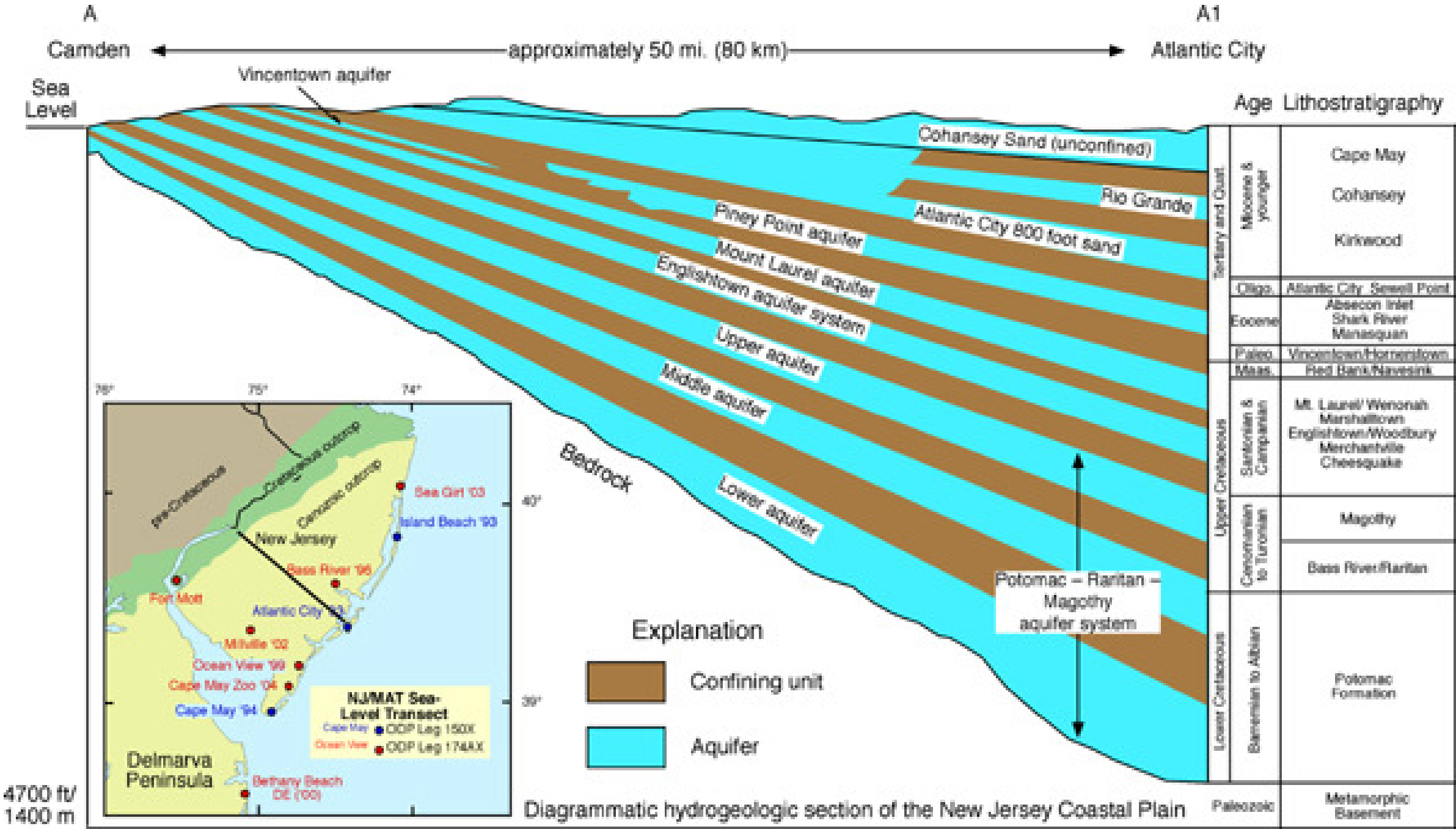
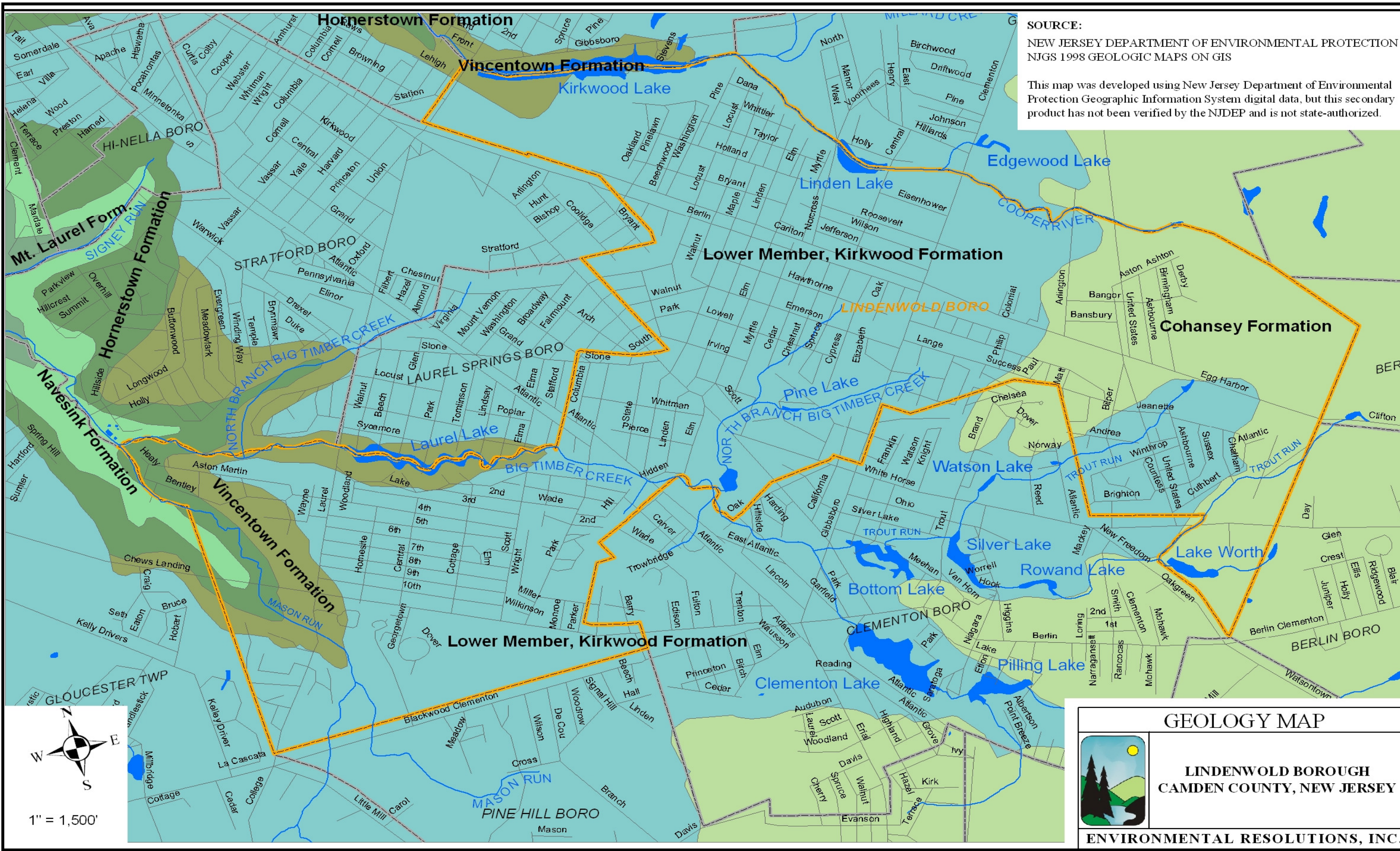


FIGURE 7 - GEOLOGY OF SOILS IN THE BOROUGH OF LINDENWOLD



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C. Soils

There are many specific types of soils within the Borough, however, there are two predominant soil types within Lindenwold. These soils can be further classified as:

- Westfalia-Budtown-Urban Land complex, Hydrologic soil type B
- Freehold-Downer-Urban Land Complex, Hydrologic soil type B

The Hydrologic soil type provides an indication of the soil behavior and permeability.

The United States Department of Agriculture has the responsibility to evaluate and classify all soils in the United States. The classification is based on standards of the biological and physical makeup of each soil. In New Jersey the County Soil Conservation Service and the New Jersey Soil Service are responsible for this task. The information is published by county and includes soil descriptions and maps.

Once a soil description is established at a specific site, this description is applied to all other soils of this type regardless of location. This description also establishes a specific name. In Lindenwold there are two predominant soil types, as listed above. These soils can be further

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Photo By Bodine



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classified into more detailed descriptions, which include elements such as slope and use. These maps were originally published to assist agricultural development. However, engineers, planners, and environmentalists use these descriptions for their site assessments. Field investigations are performed to confirm the accuracy of a site's soils.

The United States Soil Conservation Service lists fourteen (14) different soils found in Lindenwold. These fourteen (14) soils predominately fall into three (3) main categories of soil: sands, sandy loams, and urban soils. The soil types are categorized below.

- *Sands*: Individual rock or mineral fragments having diameters ranging from 0.05 mm to 2 mm.
 - Downer Loamy Sand (DoA)
 - A low water holding capacity
 - Includes a loose surface layer subject to blowing
 - Slopes range from 0 to 5%
 - Movement of water through this soil is moderate to rapid
 - Lakehurst-Lakewood Association (LbA)
 - Contains a mixture of Lakehurst and Lakewood sand.

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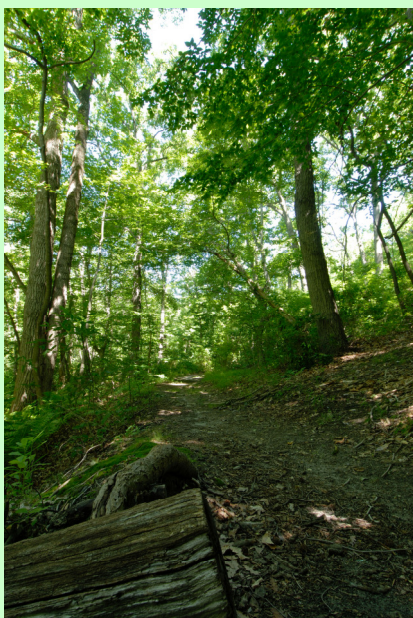


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- Slopes range from 0 to 5%
 - Usually associated with high ground water tables
 - Promotes rapid pine growth
- Lakewood Sand (LgC)
 - Occurs in long bands along streams or drainage ways at elevations of about 150 feet
 - Slopes range from 5 to 10%
 - All areas of this soil except those that have been cleared for recreational or urban use are wooded.
 - Lakewood and Lakeland Sands (LhE)
 - Occur on the top of knolls and along deeply cut streams
 - Drainage ways at elevations between 150 to 220 feet
 - Slopes range from 10 to 30%
 - These soils contain shattered slabs of ironstone as much as 1 foot thick.
 - Sand and Gravel Pits (Sg)

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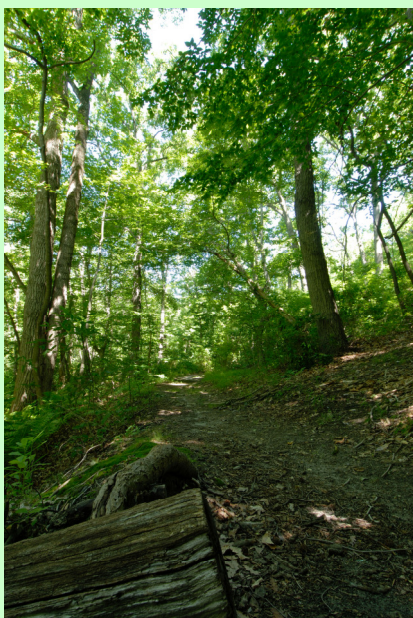


Photo By Bodine



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- Consist of pits from where sand and gravel have been or are being excavated
- Includes borrow pits from which soil material has been taken
- Deeper pits may extend into the groundwater table.

○ Westphalia Loamy Fine Sand (WfB)

- A fine soil with a loose surface layer when dry
- Slopes range from 0 to 5%
- Moderately permeable but has a high water holding capacity

○ Westphalia Loamy Fine Sand (WfC)

- Similar to WfB except that is subject to water erosion if left without cover
- Slopes range from 5 to 10%
- Small gullies form easily in some fields and are hard to control.

- *Sandy Loams:* Soil composed of approximately 60% sand, 30% silt, and 10% clay.

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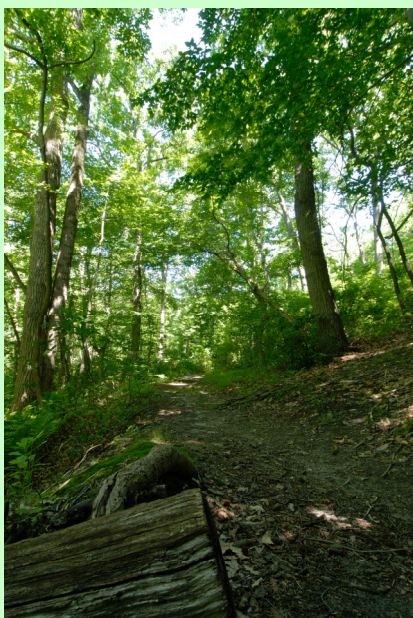


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- Loamy Alluvial Land (Lv)
 - Composed mostly of fine sandy loam, sandy loam, or loam soil material deposited recently by floodwater
 - Slopes range from 0.5 to 1%
 - Drainage in these soils is poor and they are usually associated with a very high water table.
- Nixonton and Barclay Fine Sandy Loams
 - Consists of a mixture of both soils but tends to contain more of the Nixonton soils
 - Slopes range from 0 to 5%
 - Surface of the soil is sandy and loose however the subsurface permeates slowly
- Pasquotank Fine Sandy Loam (Pa)
 - Consists of poorly drained, mottled, grayish soils that form in deposits of uniformly fine sand
 - Slopes are less than 1%
 - Drainage is slow in these soils and ponding often occurs
 - Naturally highly acidic.

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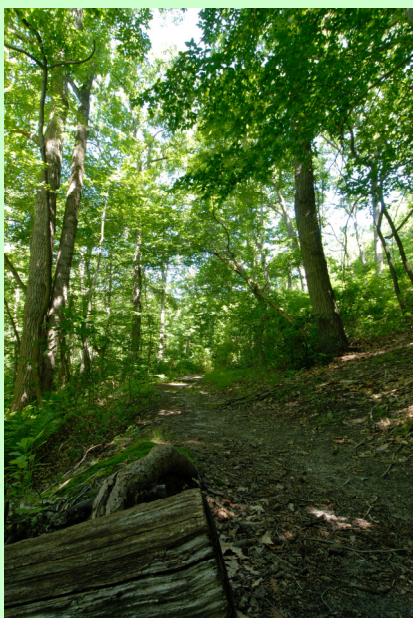


Photo By Bodine



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- Westphalia Soils (WhD)
 - Consists primarily of steeply sloping areas adjacent to streams
 - Slopes range from 10 to 20%
 - Soils range from fine sandy loam to loamy fine sand in texture
 - A permanent cover of trees, grass, or wildlife food plants is needed to prevent erosion
- *Urban Soils*: Soils that have been disturbed, mixed, or consist of fill material.
 - Urban soil compositions can range from sands to clays.
 - Made Land (Ma)
 - Consists of areas where the soil material has been so mixed by excavation, filling, or other disturbances that the original soil horizons have been destroyed
 - Pasquotank and Weeksville-Urban Land Complex (Pc)
 - Consists of Pasquotank fine sandy loam mixed Weeksville soils mixed considerably during construction

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Photo By Bodine



- Areas in urban have generally been drained, and some low areas have been filled
- Westphalia and Nixonton-Urban Land Complex (Wr)
 - Predominately Westphalia soils, but the Nixonton soils are in lower positions
 - Slopes are generally less than 5%
 - High water table in winter
 - In areas of urban development soil disturbance is extensive
 - Permeability is moderately slow, but in the substratum is moderate to rapid

Source: U.S. Department of Agriculture Soil Conservation Service

D. Wildlife

The wildlife found in Lindenwold is typical of most suburban communities present in Southern New Jersey. Due to the development of the Borough there are only three large open space areas left within Lindenwold, each with approximately fifty (50) acres. These three open space parcels represent 5% of the total land area within the Borough. Most of the Borough wildlife includes species that have adapted to living

Lindenwold Environmental Commission



Photo By Bodine



LINDENWOLD BOROUGH

within suburban habitats. The highest density of wildlife is contained within the forested habitat surrounding Mason's Run that is owned by Camden County Parks. There are three (3) different classifications for rare species of wildlife within the state of New Jersey; priority, threatened, and endangered.

- **Priority Species:** a nongame species considered to be a species of special concern by a panel of experts. Priority species also include species with regional concern with regional conservation groups such as the United States Shorebird Conservation Plan.
- **Threatened Species:** those who may become endangered if conditions surrounding them begin to or continue to deteriorate.
- **Endangered Species:** those whose prospects for survival in New Jersey are in immediate danger because of a loss or change in habitat, over-exploitation, predation, competition, disease, disturbance or contamination.

A list of known species in Lindenwold including State Priority (P), Threatened (T), and Endangered (E) species are as follows: [3]

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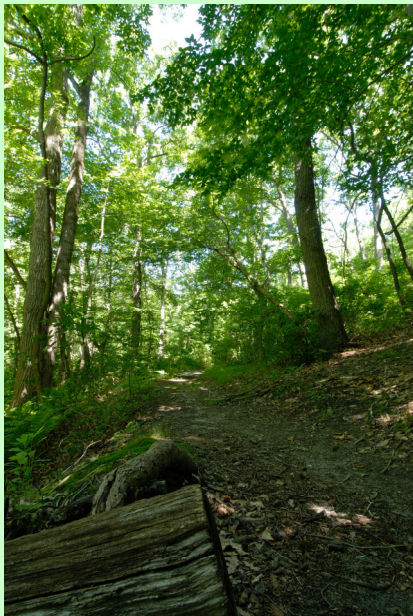


Photo By Bodine



LINDENWOLD BOROUGH

Source: N.J. Department of Environmental Protection

Mammals

- Beaver
- Big Brown Bat
- Black Rat
- Brown Rat
- Cat – Feral
- Eastern Chipmunk
- Eastern Cottontail
- Field Mouse
- Gray Fox
- Gray Squirrel
- Groundhog
- Little Brown Bat



Photo 12 Eastern Chipmunk
media-2.web.britannica.com/eb-media/45/12945



Photo 13, Red Fox
thesilvercoyote.net/images/redfox.jpg

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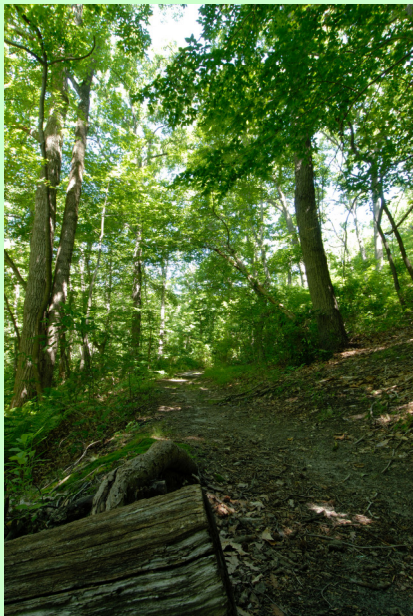


Photo By Bodine



LINDENWOLD BOROUGH

- Mole
- Muskrat
- Opossum
- Raccoon
- Red Fox
- Shrew
- Striped Skunk
- White Tail Deer



Photo 14, Raccoon

theunderbelly.files.wordpress.com/2009/01/rac
www.zoobangoo.com



Photo 15, White Tail Deer



Photo 16, Groundhog

tech4kids.files.wordpress.com/.../groundhog.jpg
www-s.aces.uiuc.edu/photolib/lib1523/midsize/skunk_in_grass.jpg



Photo 17, Striped Skunk

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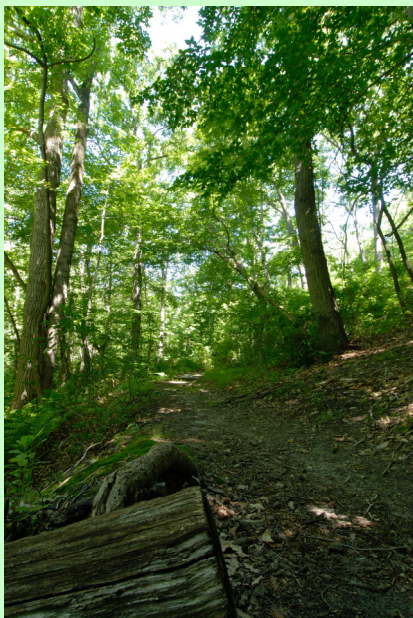


Photo By Bodine



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Birds

- American Black Duck
- American Kestrel
- Barn Swallow
- Black Cap Chickadee
- Blue Jay
- Brant
- Canada Goose
- Cardinal
- Coot
- Field Sparrow
- Gold Finch
- Great Blue



Photo 18 Great Blue Heron (P) Bodine



Photo 19, King Fisher

Bodine

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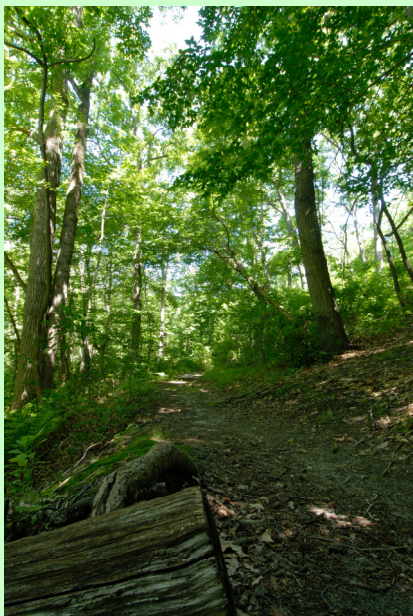


Photo By Bodine



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Heron (P)

- Herring Gull
- House Finch
- House Sparrow
- King Fisher
- Little Green Heron
- Long Eared Owl (T)
- Mallard Duck
- Mockingbird
- Mourning Dove
- Pigeon
- Pine Warbler

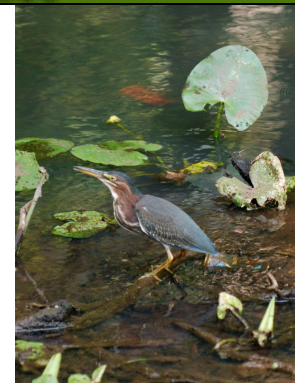


Photo 20, Little Green Heron Bodine



Photo 21, Long Eared Owl (T)
www.birdfinders.co.uk/images/

Lindenwold Environmental Commission

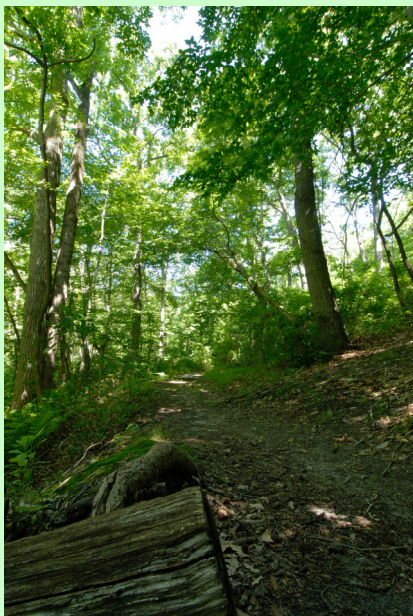


Photo By Bodine



LINDENWOLD BOROUGH

- Red Shouldered Hawk (E)
- Red Tailed Hawk
- Song Sparrow
- Starling
- Turkey Vulture
- Tufted Titmouse
- Wild Turkey
- Wood Thrush (P)



Photo 22, Wood Thrush (P)
www.naturesound.com/birds/pages/woody.html



Photo 23, Red Shouldered Hawk (E)
gallery.photo.net/photo/3205389-md.jpg

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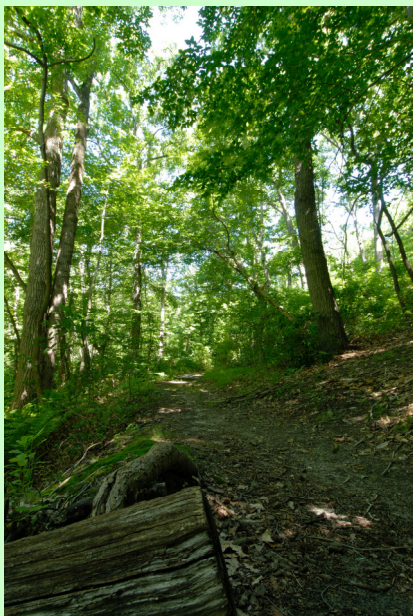


Photo By Bodine



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Reptiles & Amphibians

- Black Rat Snake
- Bullfrog
- Coastal Plain Milk Snake
- Common Musk Turtle
- Common Snapping Turtle
- Eastern Box Turtle (P)
- Eastern Garter Snake
- Eastern Hognose Snake
- Eastern Kingsnake
- Eastern Milk Snake
- Eastern Mud Turtle
- Eastern Painted Turtle



Photo 24, Eastern Painted Turtle Bodine



Photo 25, Eastern Box Turtle (P)
fwie.fw.vt.edu/VHS/reptiles/turtles/eastern

Lindenwold Environmental Commission



Photo By Bodine



LINDENWOLD BOROUGH

- Eastern Ribbon Snake
- Eastern Smooth Earth Snake
- Eastern Spadefoot Toad
- Eastern Worm Snake
- Five Lined Skink
- Four Toed Salamander
- Fowler's Toad (P)
- Green Frog
- Marbled Salamander
- New Jersey Chorus Frog
- Northern Black Racer



Photo 26, Fowler's Toad (P)



Photo 27, Coastal Plain Milk Snake
www.coastalplainsreptiles.com/Species/Snakes

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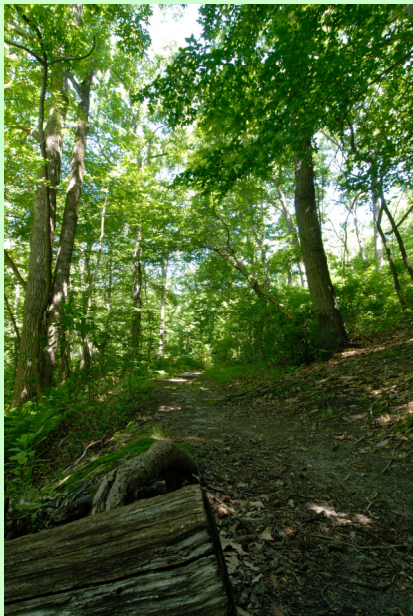


Photo By Bodine



LINDENWOLD BOROUGH

- Northern Brown Snake
- Northern Cricket Frog
- Northern Fence Lizard
- Northern Gray Treefrog
- Northern Redbelly Snake
- Northern Red Salamander
- Northern Ringneck Snake
- Northern Spring Peeper
- Northern Two-Lined Salamander



Photo 28, Red Spotted Newt
www.uky.edu/Ag/Forestry/TBarnes/



Photo 29, Northern Fence Lizard
ohiohistorycentral.org

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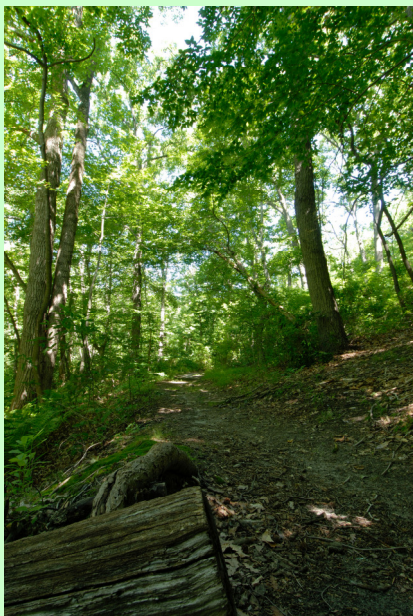


Photo By Bodine



LINDENWOLD BOROUGH

- Northern Water Snake
- Pickerel Frog
- Redback Salamander
- Red-eared Slider
- Red Spotted Newt
- Rough Green Snake
- Southern Leopard Frog
- Southern Ringneck Snake
- Spotted Turtle
- Spotted Salamander
- Wood Frog



Photo 30, Bullfrog
www.richard-seaman.com/Wallpaper/Nature/Amphibians

Lindenwold Environmental Commission



Photo By Bodine



LINDENWOLD BOROUGH

Fish

- American Shad
- Bluegill Sunfish
- Bullhead Catfish
- Carp
- Channel Catfish
- Crappie
- Largemouth Bass
- Pickerel



Photo 31, Largemouth Bass
www.duke.edu/web/nicholas/bio217



Photo 32, Pickerel

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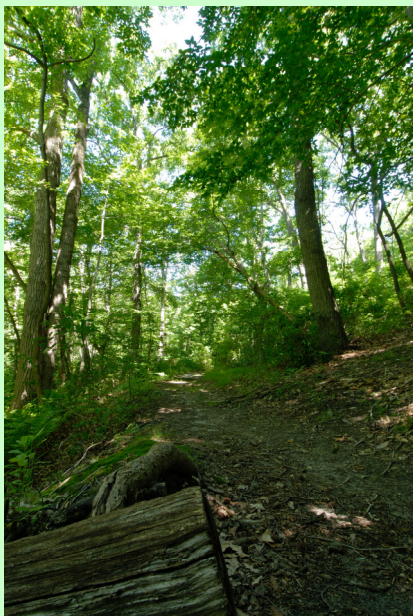


Photo By Bodine



LINDENWOLD BOROUGH

- Pumpkinseed Sunfish
- Redear Sunfish
- Smallmouth Bass
- Yellow Perch



Photo 33, Pumpkinseed Sunfish

media-2.web.britannica.com/eb-media/33/31033



Photo 34, Yellow Perch

midatlanticstocking.com

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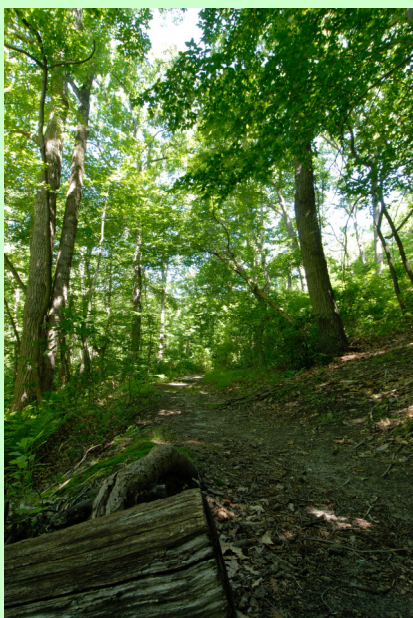


Photo By Bodine



E. Threatened and Endangered Species

The New Jersey Division of Fish, Game and Wildlife's Endangered and Non-game Species Program has developed a landscape approach to the protection of rare species within the state. The goal of the Landscape Project is to protect rare species by maintaining and enhancing wildlife populations by identifying healthy functioning ecosystems

Assistance is needed to prevent future extinction in New Jersey. All three species classifications are State Specific. For example, the corn snake is listed as a State Endangered Species but is not listed under any classification federally. There are no federally listed endangered or threatened species present in the Borough of Lindenwold.

The Landscape Project has developed a series of maps that identify rare and critical species within specialized habitats. There are five main habitats that the project considers; Forest, Grassland, Forested Wetland, Emergent Wetland and Beach/Dune. These maps are critical in the use of

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Photo By Bodine



LINDENWOLD BOROUGH

protective planning and zoning for municipalities. It should be noted that these maps only include information on animal species.

Lindenwold contains two of the main habitats listed within the Landscape Project; Forest Habitat and Forested Wetlands Habitat. Maps of both these habitats located with Lindenwold have been included as Figures 8 and 9 respectively.



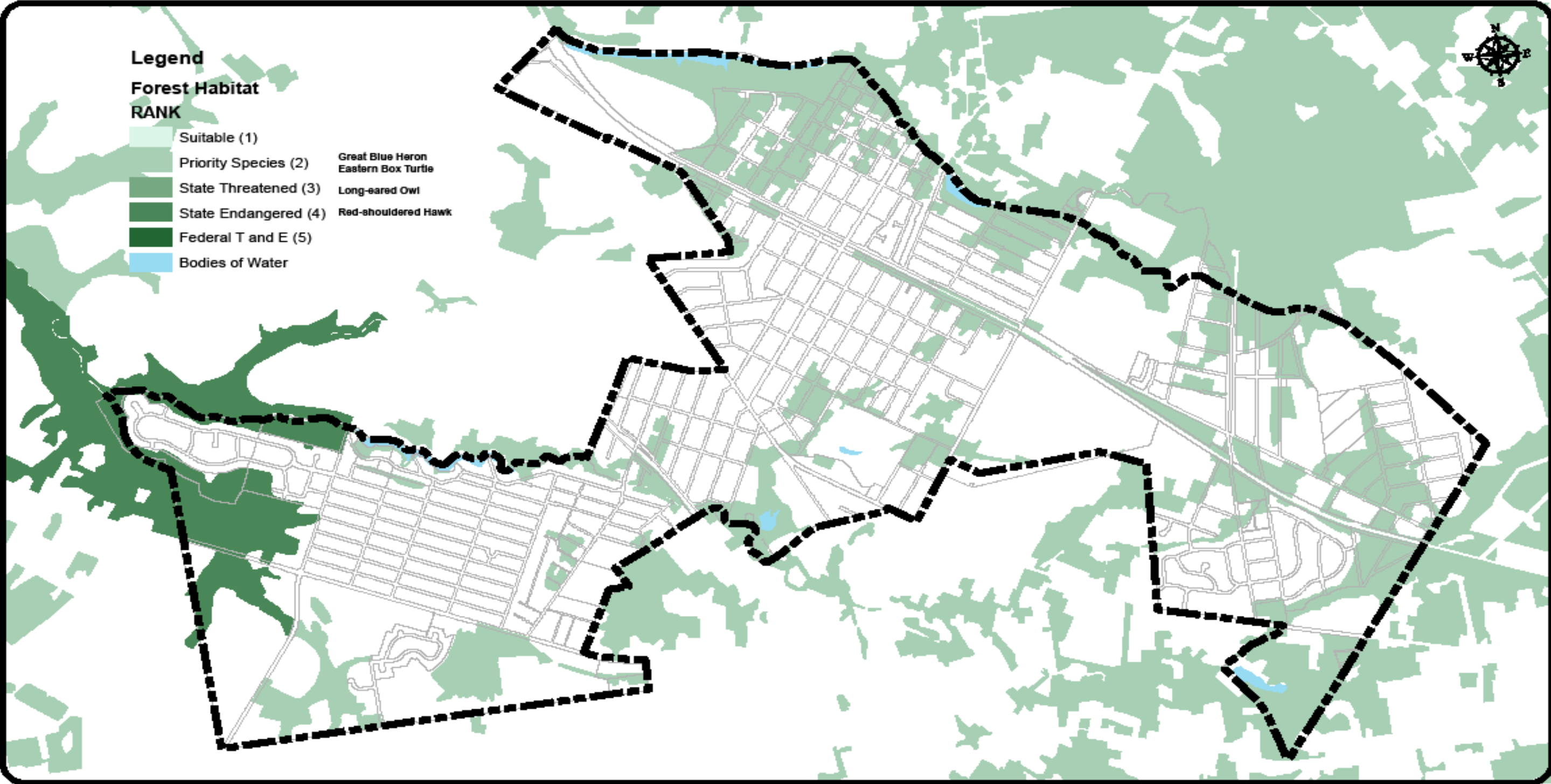
Photo, 35, Eastern Box Turtle
www.bio.umass.edu/oeb/files/box-turtles.jpg



Photo 36, Great Blue Heron, Bodine

Priority Species within the Forest Habitat in Borough of Lindenwold

FIGURE 8 – FOREST HABITAT, THREATENED AND ENDANGERED SPECIES MAP



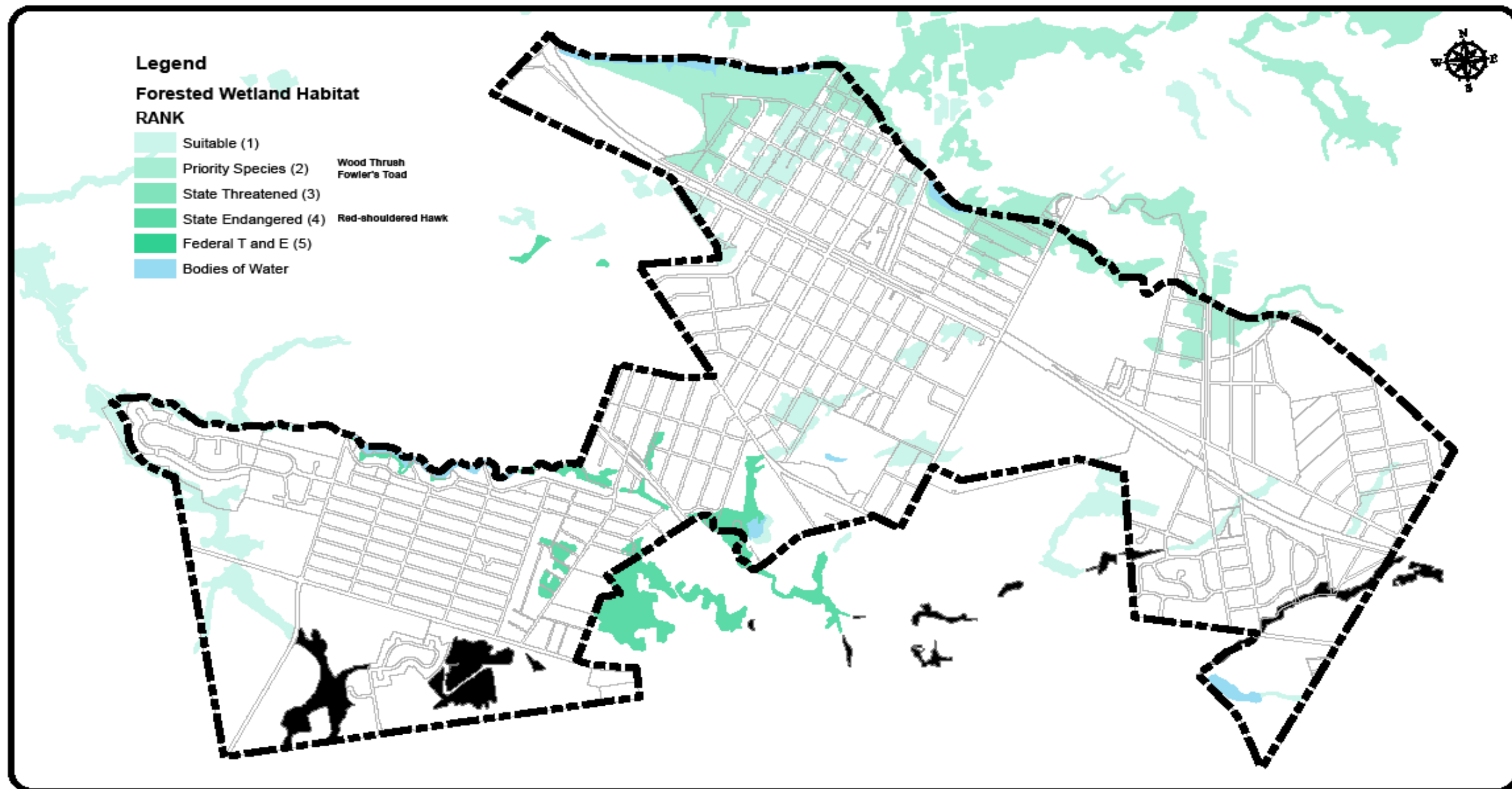
AERIALS: N.J.D.E.P. GIS SOILS DATA



ENVIRONMENTAL RESOLUTIONS, INC.
ENGINEERS SCIENTISTS & PLANNERS
525 Fellowship Road, Suite 300,
Mount Laurel, New Jersey 08054

**Forest Habitat
Threatened & Endangered Species Map**
LINDENWOLD BOROUGH
CAMDEN COUNTY, NEW JERSEY

FIGURE 9 – FORESTED WETLAND HABITAT THREATENED AND ENDANGERED SPECIES MAP



AERIALS: N.J.D.E.P. GIS SOILS DATA



ENVIRONMENTAL RESOLUTIONS, INC.
ENGINEERS SCIENTISTS & PLANNERS
525 Fellowship Road, Suite 300,
Mount Laurel, New Jersey 08054

**Forested Wetland Habitat
Threatened & Endangered Species Map**
LINDENWOLD BOROUGH
CAMDEN COUNTY, NEW JERSEY

Lindenwold Environmental Commission



Photo by Bodine



Within the Forest Habitat there are two (2) priority species, the Eastern Box Turtle and the Great Blue Heron, which are present in scattered populations throughout the borough most notably in and around the area of Kirkwood Lake. There is one (1) state threatened species, the Long-eared Owl which is localized in a forested area located between Laurel Road and the Borough line in the southwest corner of Lindenwold. The Red Shouldered Hawk, the one (1) state endangered species located in the Forest Habitat, is also localized in the same area as the Long Eared Owl.



Photo 37. Long-eared Owl, State Threatened
sdakotabirds.com



Photo 38, Wood Thrush,
roaneviews.com

Within the Borough's Forested Wetland Habitat there are two (2) priority species, the Wood Thrush and the Fowler's Toad. These species are present in scattered wetland areas and areas surrounding bodies of water including

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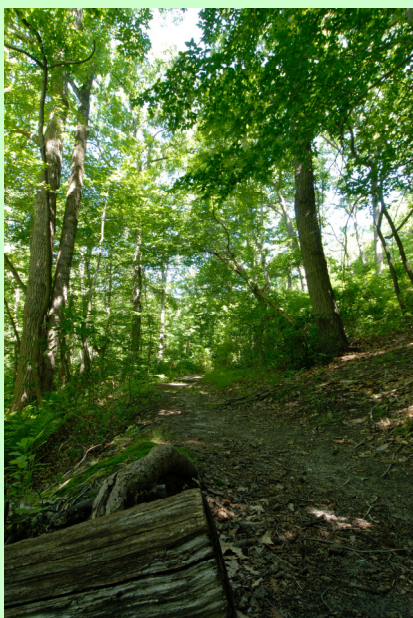


Photo by Bodine



Kirkwood Lake and Linden Lake. The Red Shouldered Hawk, a state endangered species, has also been documented in a few small wetland areas west of Overbrook Lake and south of Laurel Lake. [3]

F. Watersheds

There are 20 main watersheds in the State of New Jersey as shown in Figure 10, a map showing all the watersheds in the State. Lindenwold is located in the Watershed Area 18, the Lower Delaware Watershed, on the southwest side of New Jersey, with tributaries flowing to the Delaware River to the west. The tributaries are divided into sub-watersheds by streams and reaches and given numeric identification numbers in the watershed or "HUC" numbers.

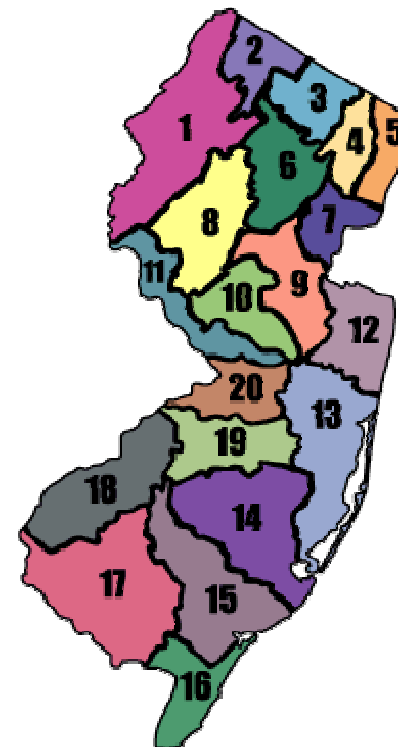


Figure 10. NJDEP Watershed Area Map of New Jersey

Lindenwold Environmental Commission

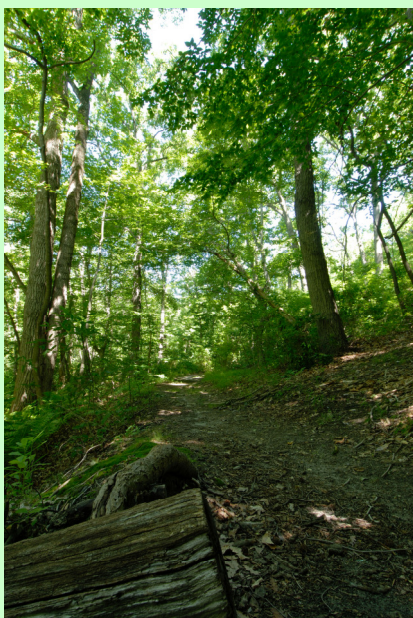


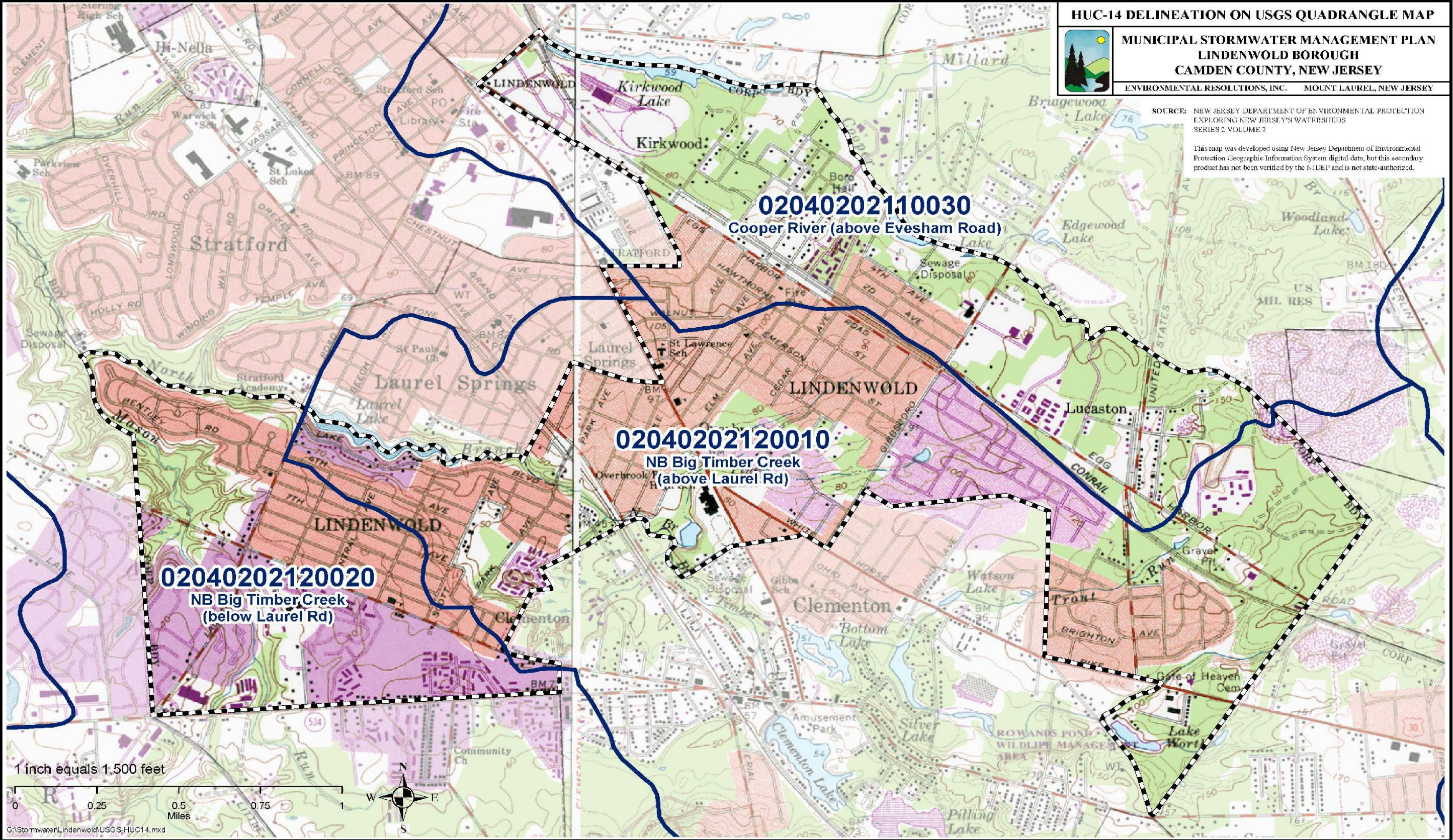
Photo by Bodine



“HUC” stands for Hydrological Unit Code, which is a numerical identification number given to every drainage system in the United States by the U.S. Geological Survey. HUC-11 codes are the 11-digit numbers applied to a part of a drainage area that is approximately 40 square miles in size. HUC-11 areas are further subdivided into HUC-14 sub-watersheds, with the identification number for each one having 14 digits.

Figure 11, shows the sub-watersheds within the Borough of Lindenwold. One sub-watershed drains to the Cooper River and is identified as Cooper River above Evesham Road and two subwatersheds drain to Big Timber Creek and are identified as the North Branch below Laurel Road and the North Branch above Laurel Road. The HUC-14 identification codes are identified for each sub-watershed on Figure 11.

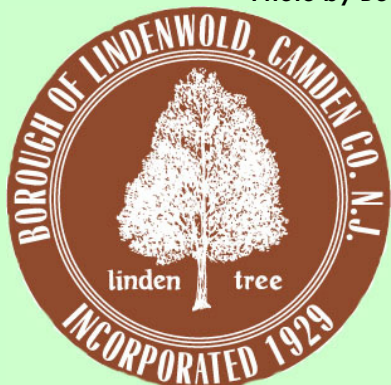
FIGURE 11 – HUC-14 DELINEATION ON USGS QUADRANGLE MAP



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Photo by Bodine



LINDENWOLD BOROUGH

Lindenwold Borough is located within Watershed Management Area 18 within the State of New Jersey. As shown in Figure 12, the streams in the Borough of Lindenwold originate in adjacent municipalities to the east. The sub-watershed within Lindenwold that drains to the Cooper River is the Southern Branch Cooper River (above Evesham Road), and is designated by the hydrologic unit code 02040202110030. The Cooper River begins at Edgewood Lake behind Bethany Baptist Church and at the municipal boundary with Gibbsboro, then travels along the municipal boundary and picks up a tributary before reaching Linden Lake, which is located behind Linden Lake Senior Housing, and the Cooper River is joined at the boundary of Lindenwold, Gibbsboro and Voorhees Township by the Nicholson Branch and Millard Creek before becoming Kirkwood Lake.

Source: N.J. Department of Environmental Protection

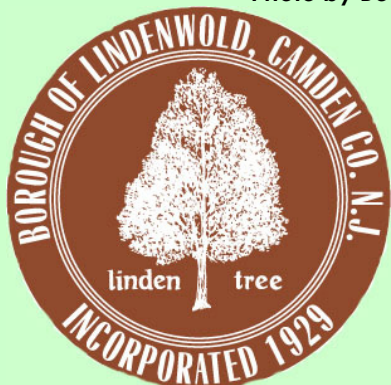
The two sub-watersheds that drain to the Big Timber Creek are:

- North Branch of the Big Timber Creek above Laurel Road (HUC 02040202120010, Figure 11)

Lindenwold Environmental Commission



Photo by Bodine



LINDENWOLD BOROUGH

- North Branch of the Big Timber Creek below Laurel Road (HUC 02040202120020, Figure 11)

The North Branch of the Big Timber Creek above Laurel Road within Lindenwold used to start at the lake that was located at the apartment complexes to the east of Gibbsboro Road. However, the construction of the apartments eliminated the lake. The tributary now starts within the impervious coverage of the apartment complex and only a ditch remains where the lake previously existed. (See Photo 34)

The stream (North Branch of the Big Timber Creek above Laurel Road) then is piped under Gibbsboro Road and travels through a wetlands area before becoming a lake within an apartment complex on the western side of

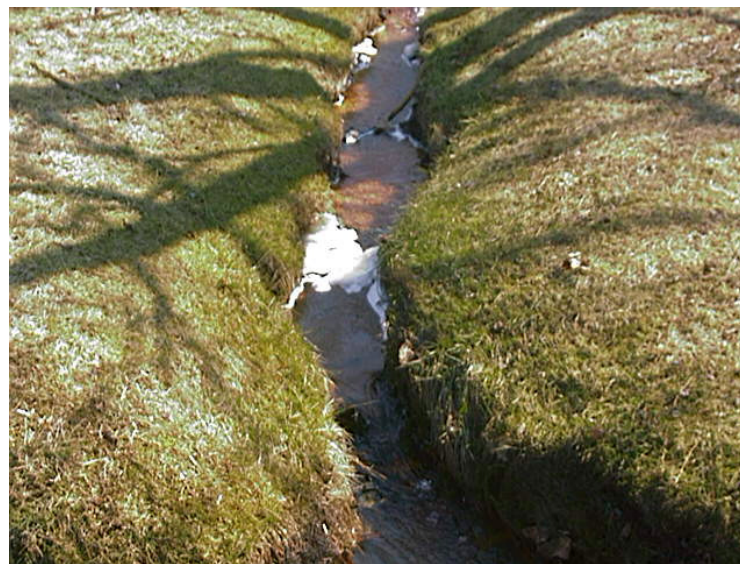


Photo 34, Ditch at Coachman Manor Apartments where lake previously existed as headwater to Big Timber Creek, Becica

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Photo by Bodine



LINDENWOLD BOROUGH

Gibbsboro Road. The stream is then discharged into a wetlands area before being contained in reinforced concrete pipes under The White Horse Pike.

The stream (North Branch of the Big Timber Creek above Laurel Road) then continues toward Overbrook Lake.

The flood plain area before Overbrook Lake and the embankments adjacent to the stream

show signs of erosion, embankment failure,

siltation and fallen trees. The Lindenwold Environmental Commission performs clean-ups of this area in conjunction with the Lindenwold Schools and plans on doing more in the future.

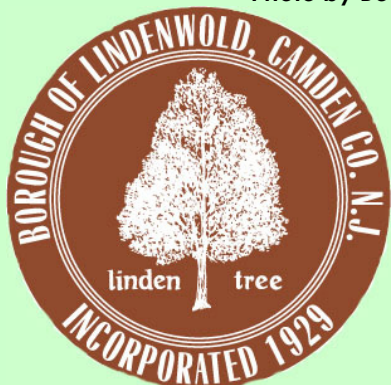


Photo 35, Storm Pipes Discharging from Under White Horse Pike, Becica

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Photo by Bodine



Overbrook Lake is created by a dam structure built during the Great Depression. The structure appears to be in good condition but needs regular inspection and maintenance due to its age. The dam was inspected by a structural engineer for the Lindenwold Board of



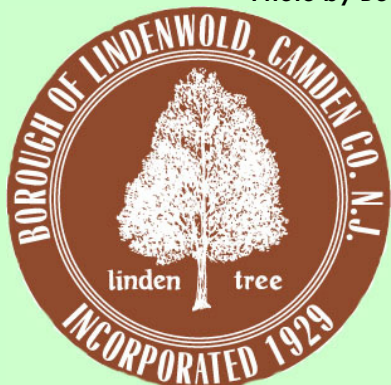
Education in Jan. Photo 36, Dam Structure at Overbrook Lake, Becica 2009 and a technical report was submitted to the State of New Jersey Dam Safety creating a five year plan.

After Overbrook Lake, the stream (North Branch of the Big Timber Creek above Laurel Road) is joined by the main branch of Timber Creek coming from Clementon Borough and Trout Run from

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Photo by Bodine



Berlin Borough. The stream widens and travels through a wetland area before crossing under East Atlantic Avenue and the railroad line at a structure known locally as the Indian steps. After the stream travels under the rail line, it must turn ninety degrees and a storm pipe also discharges flow into the stream from Atlantic Avenue to the east. The opposite embankment is severely eroded.

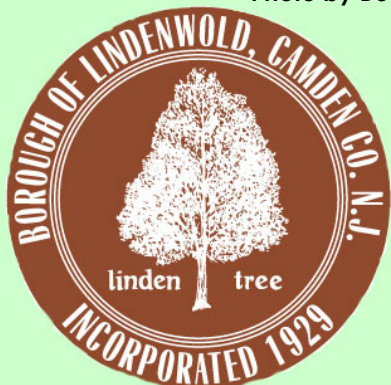


Photo 29, "Indian Steps" on North Branch of Big Timber Creek, Becica

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Photo by Bodine



LINDENWOLD BOROUGH

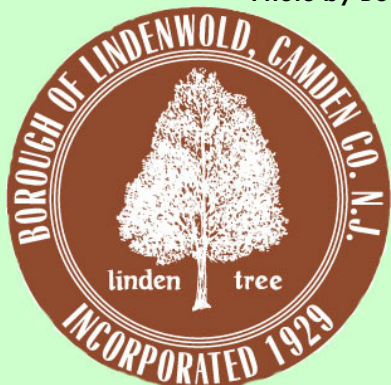
The stream (North Branch of the Big Timber Creek above Laurel Road) continues to Laurel Lake. The stream has experienced siltation over the entire of lake area. The residents of Laurel Lake are concerned about the siltation of the lake, the number of trees that have fallen in the lake and the general condition of the lake. Lake lowering permits have been obtained by the Borough since 2000 in order to perform annual spring clean up events. The lake lowering efforts will continue on a bi-annual basis.

As can be seen on Figure 12, the North branch of the Big Timber Creek continues along the Lindenwold Stratford municipal boundary after Laurel Lake until it joins with Masons Run. Masons Run joins the North Branch of the Big Timber Creek to the west of Laurel Road. Masons Run starts in Pine Hill Borough and travels through a woodland area in Lindenwold that is owned by Camden County Parks.

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Photo by Bodine



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G. Water Quality, Stream Monitoring Network

Water quality standards are established by federal and state governments to ensure that water is suitable for its intended use. The federal Clean Water Act (P.L. 95-217) requires that, wherever possible, water-quality standards provide water suitable for fish, shellfish, and wildlife to thrive and reproduce and for people to swim and boat.

The determination of whether or not water quality is sufficient to meet a waterbody's designated use(s) is based on numerous surface water quality parameters. Some examples of surface water quality parameters include fecal coliform, dissolved oxygen, pH, phosphorous, and toxic substances. NJDEP also evaluates water quality by examining the health of aquatic life in a stream.

The New Jersey Department of Environmental Protection (NJDEP) has established an Ambient Biomonitoring Network (AMNET) to document the health of the state's waterways. There are over 800 AMNET sites throughout the state of New Jersey. These sites are sampled for benthic macro invertebrates by NJDEP on a five-year cycle. Benthic macro invertebrates include aquatic insects, worms, snails, crayfish and clams.

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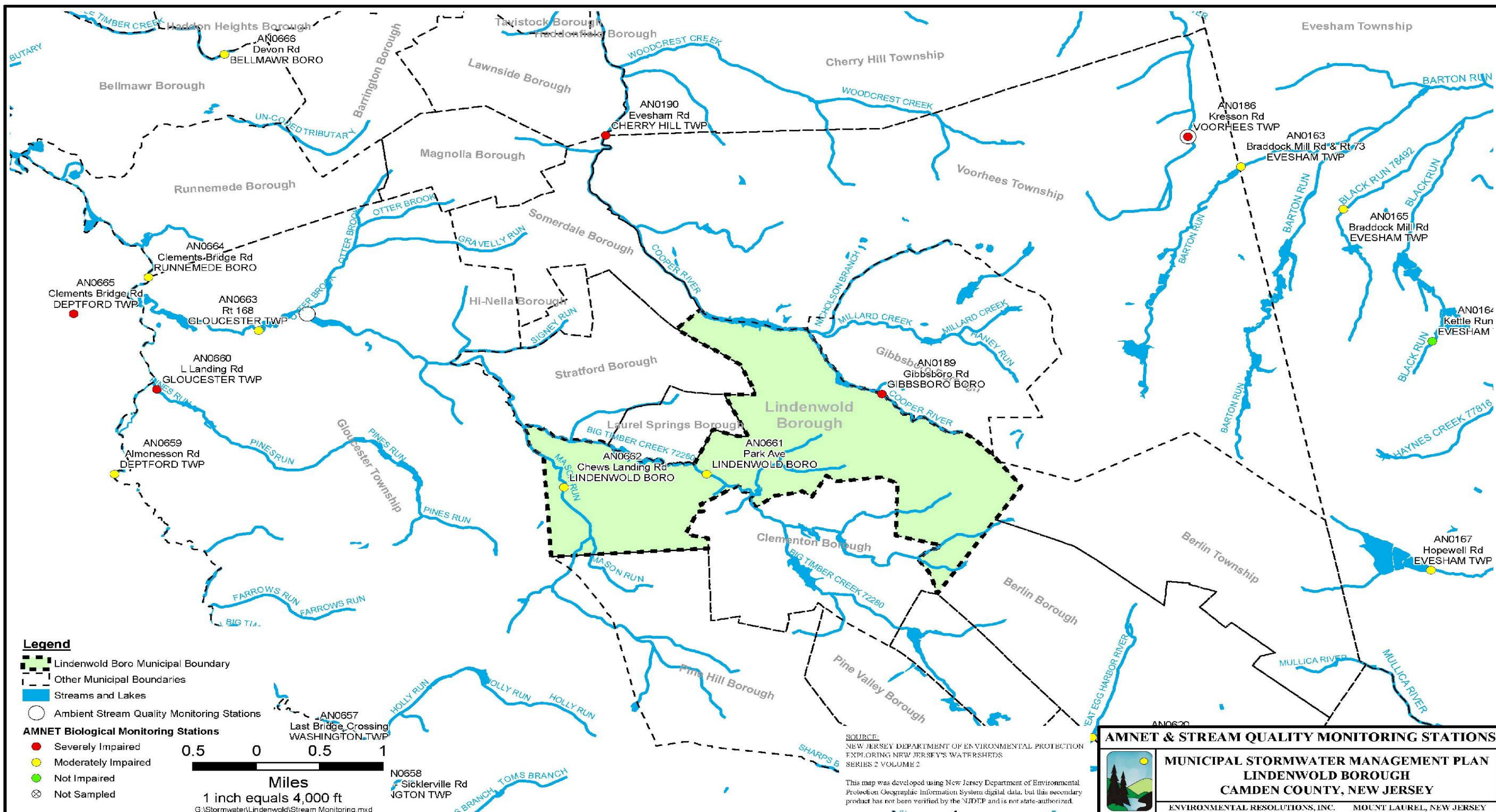
Photo by Bodine



LINDENWOLD BOROUGH

Streams are classified as non-impaired, moderately impaired, or severely impaired based on the AMNET data. The data is used to generate a New Jersey Impairment Score (NJIS), which is based on a number of biometrics related to benthic macro invertebrate community dynamics. There are two AMNET sites in Lindenwold, one on the Big Timber Creek at Park Avenue and one on Masons Creek at Chews Landing Road. The AMNET sites within the Borough of Lindenwold are shown in Figure 12. The Big Timber Creek station at Chews Landing Road and the Big Timber Creek station at Park Avenue are both moderately impaired for benthic macro invertebrates. The Cooper River station at Gibbsboro Road along the Lindenwold boundary with Gibbsboro is severely impaired for benthic macro invertebrates.

FIGURE 12 – STREAMS, AMNET AND STREAM QUALITY MONITORING



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Photo by Bodine



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The New Jersey Integrated Water Quality Monitoring and Assessment Report, 305(b) and 303(d) are required by the Federal Clean Water Act. The report identifies waters that are impaired by watershed area. Sublist 5 of the Integrated List constitutes the list of waters impaired or threatened by pollutants. The AMNET list can help identify an evaluation of the stream's ability to support biological life forms and indicate the overall health of the stream, but it does not provide information regarding the causes of the impairment.

The total maximum daily load, abbreviated TMDL, is the amount of a pollutant that can be accepted by a water body without exceeding water quality standards or interfering with the ability to use a water body for one or more of its designated uses. The allowable load is allocated to the various sources of the pollutant, such as stormwater and wastewater discharges, which requires an NJPDEP permit to discharge, and nonpoint source, which includes stormwater runoff from agricultural areas and residential areas, along with a margin of safety. Provisions may also be made for future sources in the form of reserve capacity. An

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Photo by Bodine



LINDENWOLD BOROUGH

implementation plan is developed to identify how the various sources will be reduced to the designated allocations.

Implementation strategies may include improved stormwater treatment plants, adoption of ordinances, reforestation of stream corridors, retrofitting stormwater systems, and other best management practices or BMPs.

A TMDL Report was issued for the Cooper River by the New Jersey Department of Environmental Protection on April 19, 2004 entitled Amendment to the Tri-County Water Quality Management Plan, Total Maximum Daily Loads for Total Phosphorus to Address Four Streams Segments and Two Lakes in Cooper River Watershed, Camden County Lower Delaware Water Region.



Section IV. General Environmental

Photo 37, Storm Inlet in Conformance with Attachment C of Stormwater Regulations, Becica

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Photo by Bodine



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A TMDL Report was issued for the Cooper River by the New Jersey Department of Environmental Protection on April 21, 2003 entitled Amendment to the Lower Delaware Water Quality Management Plan, Mercer County Water Quality Management Plan, Monmouth County Water Quality Management Plan, Ocean County Water Quality Management Plan and Tri-County Water Quality Management Plan, Total Maximum Daily Loads for Fecal Coliform Address 27 Streams in the Lower Delaware Water Region.

H. Wetlands

The wetlands located within the Borough have been mapped by the NJDEP and can be seen in Figure 13. The largest area of wetlands is located in the far north portion of the Borough, adjacent to Kirkwood Lake. There are other pockets of wetlands adjacent to Big Timber Creek, Trout Run, and Mason's Run. The wetlands lines in Figure 13 have not been field verified and they may not necessarily exhibit all the characteristics of wetland areas. This map should only be used as a guide and not for regulatory or development purposes.

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Photo by Bodine

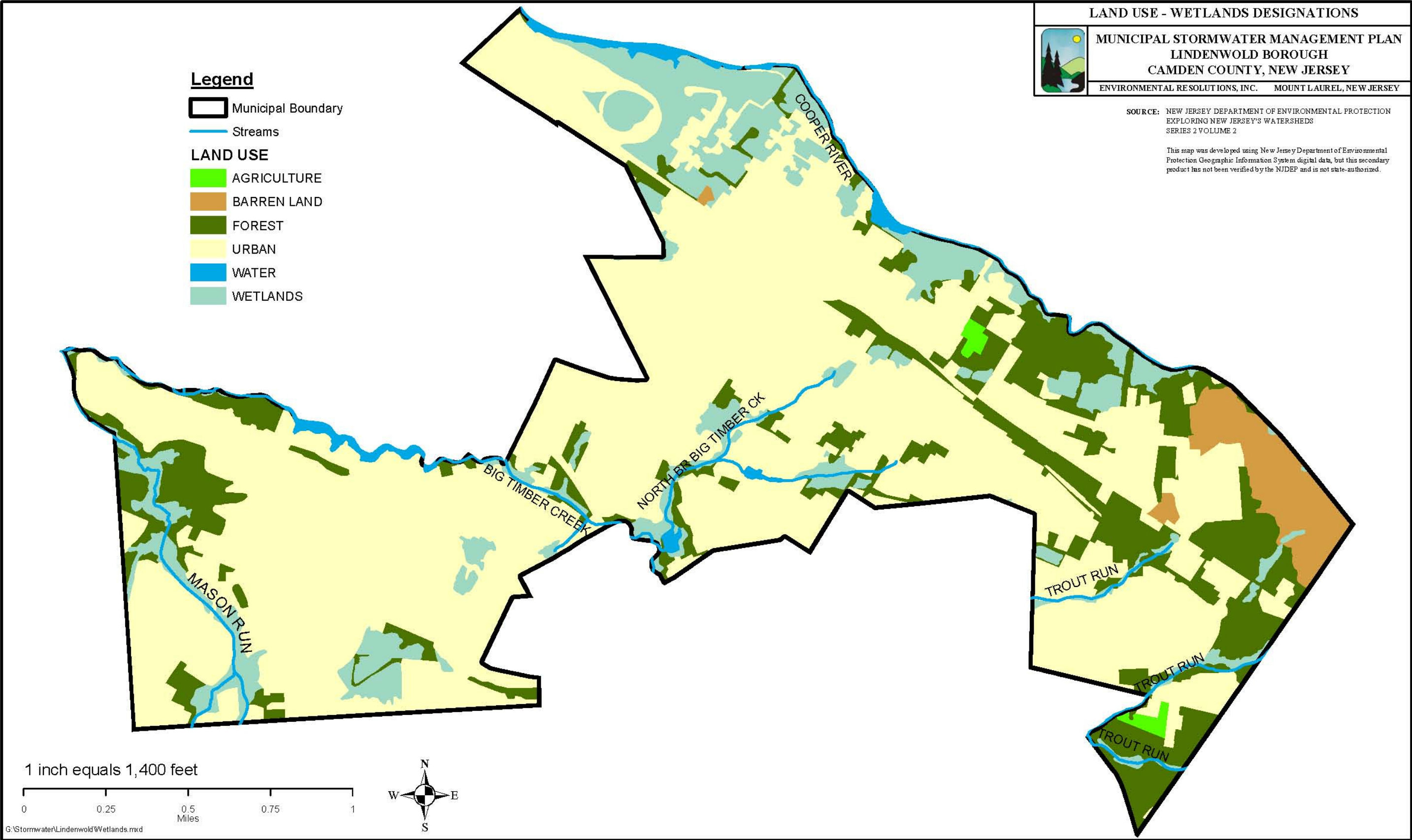


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Wetlands are regulated through N.J.A.C.7:7A under the Division of Land Use Regulation Freshwater Wetlands Program. The guide to New Jersey's Freshwater Wetlands permitting program is found on www.nj.gov/landuse/fww.html and the following pages.

The wetlands within the Borough of Lindenwold will generally be classified as intermediate resource value under N.J.A.C.7:7A-2.4. The standard width of transition area adjacent to a freshwater wetland of intermediate resource value is fifty (50) feet unless modified through the issuance of a transition area waiver per N.J.A.C.7:7A-6.1(a) through NJDEP. Although the rules for a transition waiver are numerous, it should be noted that without additional municipal ordinances placing more stringent buffers onto environmentally sensitive areas like wetlands, NJDEP may allow the transition area adjacent to a delineated wetland be reduced to ten (10) feet with compensation made elsewhere on the site through issuance of a transition area wavier.

FIGURE 13 – WETLANDS DESIGNATIONS MAP



Lindenwold Environmental Commission



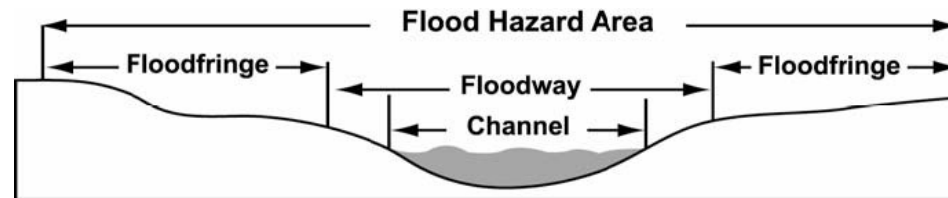
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LINDENWOLD BOROUGH

I. Floodplains

Areas naturally subject to flooding are called floodplains, or flood hazard areas. Floodplains encompass a floodway, which is the portion of a floodplain subject to high velocities of moving water, and the adjacent flood fringe, which helps to hold and carry excess water during overflow of the normal stream channel. The 100-year floodplain is defined as the land area that will be inundated by the overflow of water resulting from a 100-year flood (a flood that has a 1% chance of occurring in any given year).



Parts of a Flood Hazard Area

Although the terms “flood hazard area” and “100-year floodplain” denote similar concepts, NJDEP defines them in slightly different ways. New Jersey’s regulations define the flood hazard area as the area inundated by a flood resulting from the 100-year discharge increased by 25%. This type of flood is called the “flood hazard area design flood” and it is the flood regulated by NJDEP.

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Photo by Bodine



LINDENWOLD BOROUGH

Floodplains require protection in order to prevent loss to residents, especially within the boundaries of the floodway. Equally important is the preservation of the environmentally sensitive aquatic communities that exist in floodplains. These communities are often the first link in the food chain of the aquatic ecosystem. In addition, floodplains serve the function of removing and mitigating various pollutants, through the uptake by their vegetation of excess chemical loads in the water and by the filtering of sediments generally. All efforts to keep development out of floodplains will help to preserve the flood-carrying capacity of streams and their water quality.

The flood plain areas within Lindenwold are shown in Figure 14. The areas that are prone to flooding due to large rain events are the areas adjacent to Mason's Run, Kirkwood Lake and Laurel Lake. These areas have been documented as flood prone areas by the United States Geological Survey.

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Photo by Bodine



In 2007 and 2009, the Borough of Lindenwold revised Ordinance Section 117-3.2, Flood Damage Prevention ordinance as required by the NJDEP, office of Engineering and Construction. The ordinance changes the flood plain mapping and definition of flood hazard areas and loss and replacement provisions. The Borough is in compliance with State and Federal Emergency Management agency (FEMA) flood hazard regulations. Individual homeowners can inquire about flood hazard lines by searching for "FEMA Map Service Center" to create a flood map by address. The website for FEMA maps is:

<http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1&userType=G>

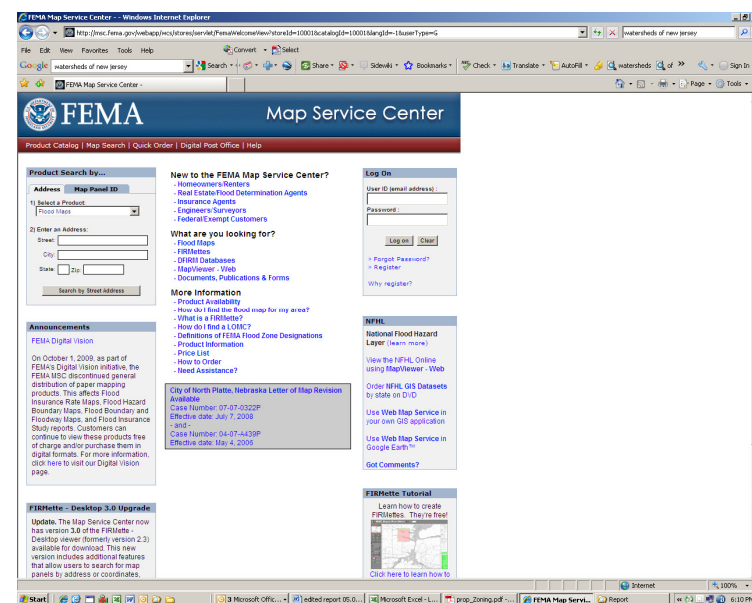
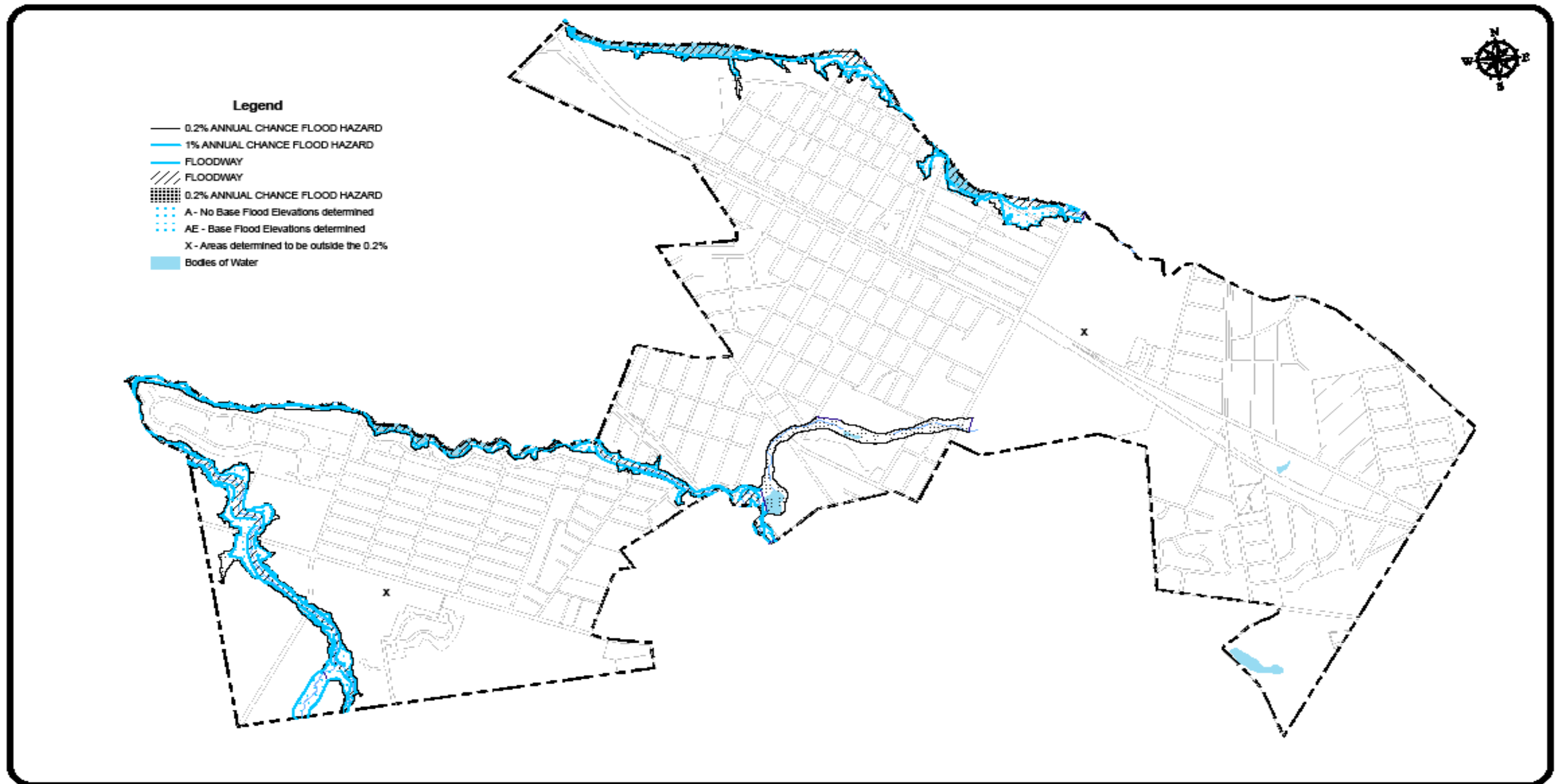


FIGURE 14 – FEMA MAP



AERIALS: FEMA FLOOD INSURANCE RATE DATA EFFECTIVE DATE : 6/16/09



ENVIRONMENTAL RESOLUTIONS, INC.
ENGINEERS SCIENTISTS & PLANNERS
525 Fellowship Road, Suite 300,
Mount Laurel, New Jersey 08054

FEMA MAP

LINDENWOLD BOROUGH
CAMDEN COUNTY, NEW JERSEY

Lindenwold Environmental Commission



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J. Known Non-Residential Contaminated Sites

There are fourteen (14) NJDEP Known Contaminated Sites that are not residential homes within the Borough of Lindenwold. These sites contain some form of either soil and/or groundwater contamination. These sites range from service stations to commercial businesses to industrial properties. The listed sites may be in various states of remediation or may not have been remediated at all. Figure 15 shows the locations of the 14 known sites and Chart 1 lists the contaminated sites and their addresses. [3]

**FIGURE 15 – KNOWN NON-RESIDENTIAL CONTAMINATED SITES
WITHIN THE BOROUGH OF LINDENWOLD**

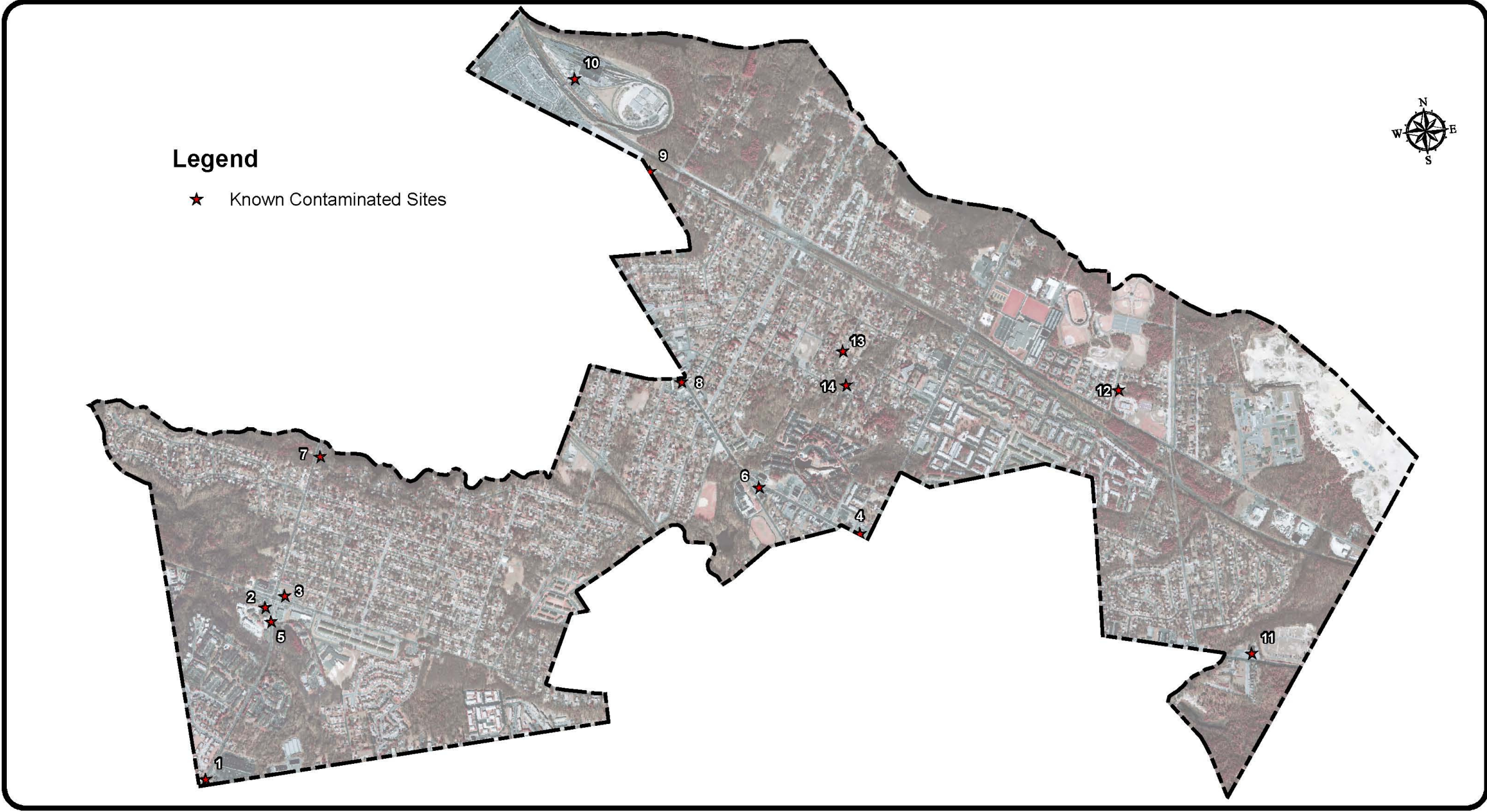


TABLE 6 – KNOWN CONTAMINATED SITES

Map ID	Site ID (Master File)	PI Number	PI Name	Line1 Address	X	Y	Home Owner
1	9984	003759	LUKOIL #57272	829 BLACKWOOD CLEMENTON RD	345145	354212	No
2	9985	007217	US GAS DAIBES SVC STATION	1500 LAUREL AVE	346335	356815	No
3	9990	007631	LINDENWOLD SHELL GAS STATION	1409 LAUREL RD	346661	356962	No
4	9991	016176	#100317 SUNOCO 0013-4072	851 WHITEHORSE PK	355770	357072	No
5	9993	016431		1205 LAUREL RD	346405	356583	No
6	9994	016530	RJ SUN LLC LINDENWOLD	304 WHITEHORSE PK	354256	357951	No
7	45314	000730	CITGO LINDENWOLD	LAUREL RD & LAKE BLVD	347422	359092	No
8	45315	000731	XTRA	112 WHITEHORSE PK BERLIN AVE & BRYANT AVE	353201	359719	No
9	46842	010397	56115 GETTY PORT AUTHORITY		353020	363064	No
10	57067	032817	TRANSIT CORP LINDENWOLD	801 BERLIN AVE	351980	364629	No
11	64195	569	MOOSE LODGE LINDENWOLD	2425 WHITEHORSE PK	361732	354614	No
12	64897	938	IND PARK	ARLINGTON AVE	360039.2	358938.57	No
13	74990	862	400 CHESTNUT ST E	400 CHESTNUT AVE	355774	359961	No
14	356324	439949	318 SPRUCE AVENUE	318 SPRUCE AVE	355776	359425	No

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Photo By Bodine



LINDENWOLD BOROUGH

K. Water Supply

Public water is supplied to the Borough residents by New Jersey American Water Company. The Borough has two (2) wells at Lindenwold Park.

L. Public Sanitary Sewer and Private Sanitary Sewer

Camden County Municipal Utility Authority (CCMUA) treats the sewage discharges from the properties within the Borough with pump stations in the Borough to transmit sewage to the treatment facility in Camden, New Jersey. The Lindenwold Borough Public Works Department is responsible for the maintenance and repair of all sewer lines, manholes and pumping stations within the Borough. Residents are responsible for all repairs and maintenance on their side of the right-of-way.

The CCMUA treats 58 million gallons of sewage per day at two (2) separate plants, the Delaware No. 1 Water Pollution Control Facility and the Winslow Water Pollution Control Facility. The CCMUA was required to construct these plants by the United States Environmental Protection Agency in order to bring Camden County up to compliance with the Federal Clean Water Act.

Lindenwold Environmental Commission



Photo By Bodine



LINDENWOLD BOROUGH

Before the Regional Wastewater Treatment System was constructed, 45 million gallons per day of untreated sewage was discharged into the county's lakes and streams. Many local treatment plants were undersized and handling more flow than they could properly treat. At the time the State of New Jersey ranked Camden County's wastewater treatment system as the number one environmental protection priority in the state. In 1972, the Camden County Board of Chosen Freeholders created the Camden County Municipal Utilities Authority to meet the requirements of the Federal Water Pollution Control Act of 1967. After the installation of the two new plants pollution of county waterways was reduced by 90% to 95%. By providing the proper wastewater treatment, Camden County's streams and lakes are being environmentally restored so that they can support county residents and wildlife. [5]

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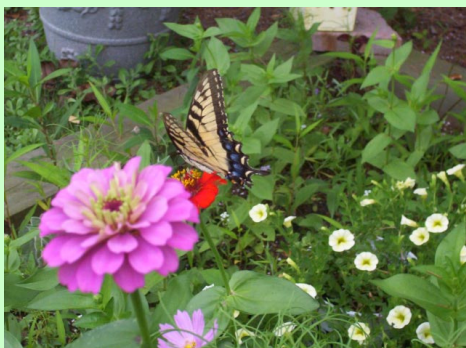


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LINDENWOLD BOROUGH

SECTION V. UNIQUE ENVIRONMENTAL CONDITIONS

A. Lake Conditions

Overbrook Lake. There are no known studies or reports for Overbrook Lake. In 2009, Environmental Resolutions, Inc. and Taylor Wiseman & Taylor conducted a dam inspection at the lake. The concrete spillway and earthen dam were found to be in fair to good condition. The spillway has signs of minor cracking, deterioration, and efflorescence at the pier, abutment walls, and flared retaining walls.

A report was developed from the inspection results. In order to ensure and prolong the life of the dam the following recommendations were suggested in the report:

- Repair or replace the low level sluice gate to allow for proper operation. This will allow the lowering of the lake and a more in-depth inspection of the spillway.
- Remove the trees and brush from within the limits of the dam on both upstream and downstream slopes. The slopes should be stabilized with stabilization matting, topsoil, and seed.
- An Operations and Maintenance Manual (O & M) should be prepared as per current Dam Safety requirements.

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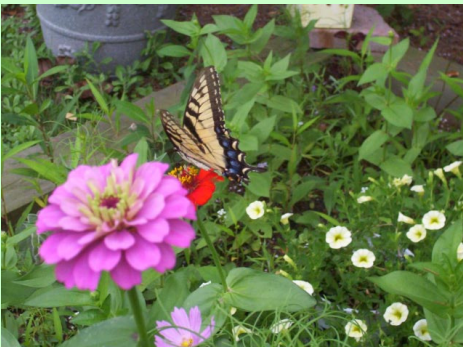


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- Perform a Hydrology and Hydraulic Analysis (H & H Analysis) to determine the appropriate dam classification and adequacy of the spillway.
- Raise the dam in the area immediately adjacent to the spillway to increase the available freeboard before overtopping. Results of the H & H will set the top elevation of the dam.
- From a safety standpoint, consideration should be given to installing a handrail along the flared wing walls.

The Lindenwold Environmental Commission has organized annual clean ups at Overbrook Lake to remove trash, detritus, and large logs from the lake and dam.

Kirkwood Lake. Kirkwood Lake has permanent residents on the Voorhees side of the lake in residential homes that once were cottages in the country. On the Lindenwold side of the lake, there are no homes directly adjacent to Kirkwood Lake. The PATCO maintenance yard is located on the Lindenwold side of Laurel Lake toward the western end and White Horse Road. Camden County owns the land adjacent to the

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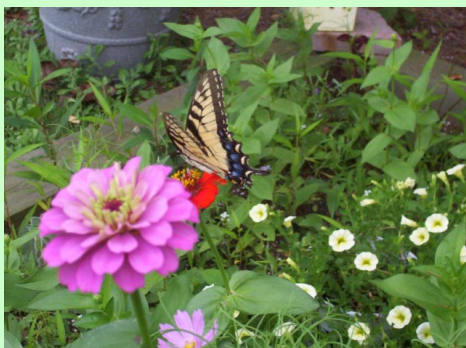


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eastern end of the lake. The County lands are listed in the Recreation and Open Space Inventory and cannot be developed. [6]



Photo 38, Kirkwood Lake

Laurel Lake. The drainage shed into Laurel Lake is the network of residential streets on both the north and south sides of the lake. Fifty –two (52) storm inlets drain into the lake on the Laurel Springs side. Thirty-seven (37) storm inlets drain into the lake on the Lindenwold side. There is a buffer of open space of undeveloped but unpreserved land on the Lindenwold side of the lake.

Lindenwold Environmental Commission

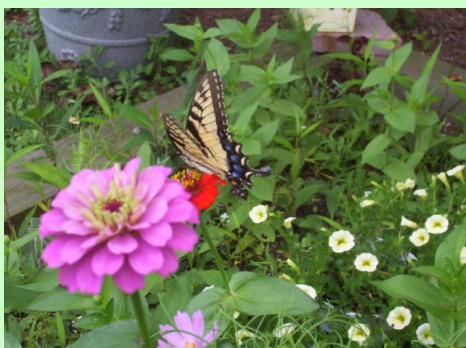


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LINDENWOLD BOROUGH

The lake is impounded by a dam at the far west end on the opposite side of Laurel Road. The dam is controlled by Laurel Springs Borough Department of Public Works. The Borough of Lindenwold contributes toward the maintenance expenses of the preparation of annual inspection reports etc. Since 2005, Lindenwold and Laurel Springs have joined to perform a cooperative annual lake lowering and clean up. Through a NJDEP lake lowering permit, the lake has been lowered approximately eighteen (18) inches by opening the sluice gate. The banks of the lake are then cleaned of vegetation, trash, and detritus by both Public Works Departments and the residents surrounding the lake. The Lindenwold Environmental Commission has also held lake clean ups with the aid of the local Boy Scouts of America Troop and various volunteers.

In the fall of 2006, Lindenwold Borough and Environmental Resolutions, Inc. completed a Lake Improvement Project to help control the amount of debris entering Laurel Lake. In accordance with the NJPDES Phase II Stormwater regulations the Borough replaced almost all inlet grates and heads draining into the lake with Eco heads and grates. These new grates and heads contain smaller openings so that trash and

Lindenwold Environmental Commission

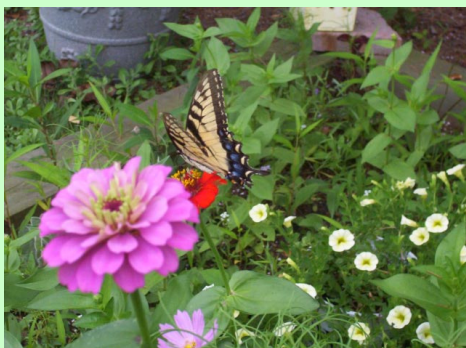


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LINDENWOLD BOROUGH

debris will be prevented from entering the lake. The project also included installing benches, trash cans, and recycling bins in areas overlooking the lake on streets with

access in the Borough of Laurel Springs. These improvements provide the residents with areas to observe the lake and discard waste in a proper manner. Lindenwold and Laurel Springs Boroughs have committed to cleaning and maintaining Laurel Lake so that it can be enjoyed by both communities.



Photo 33, Laurel Lake

Lindenwold Environmental Commission

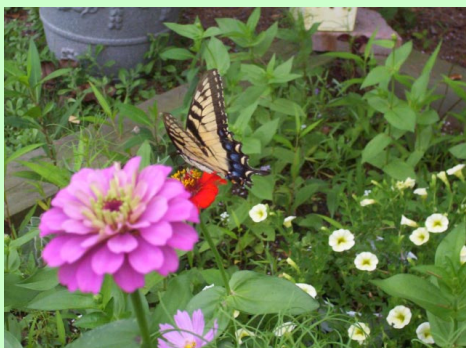


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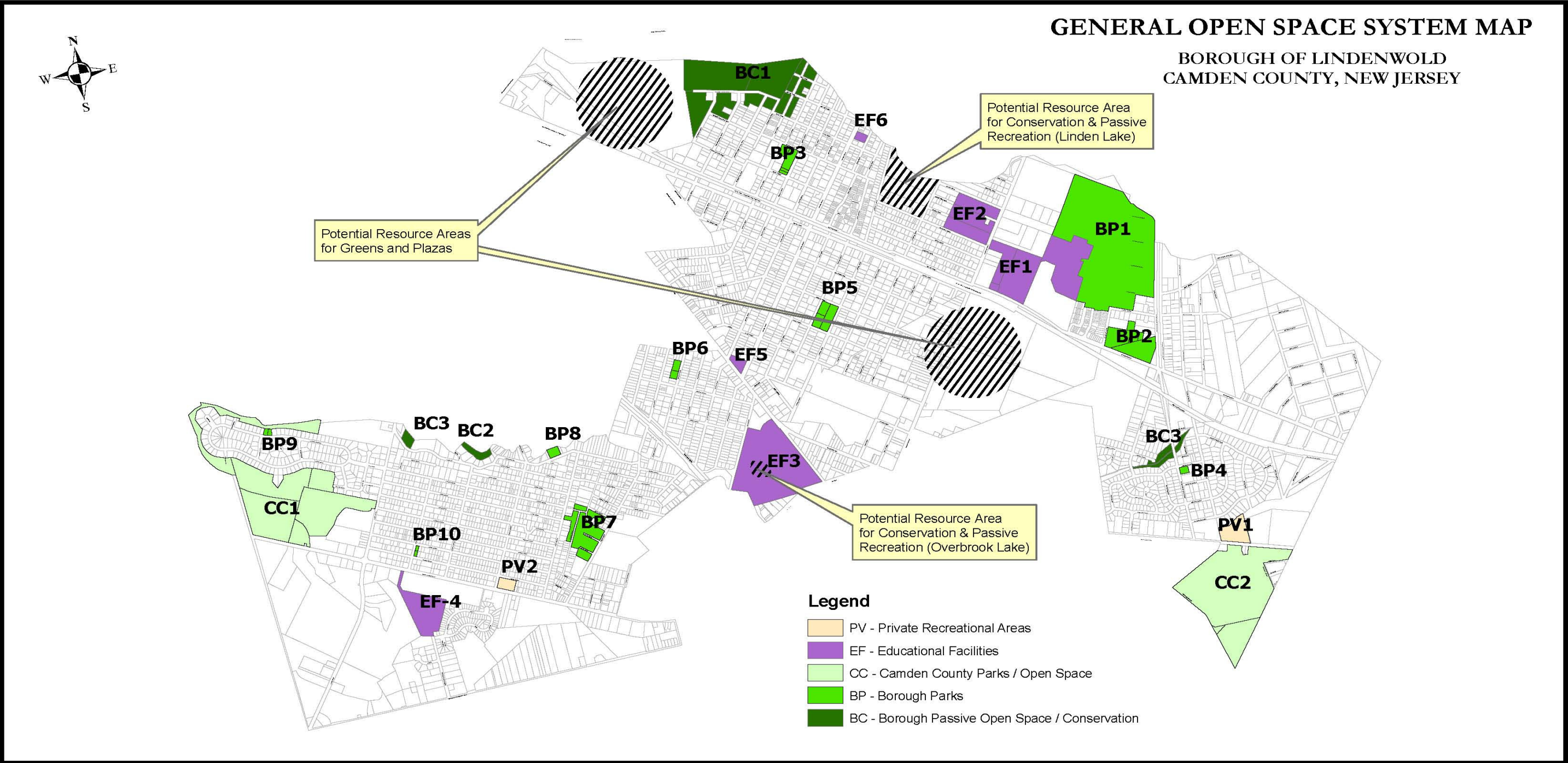
B. Open Space

The Borough of Lindenwold has a Recreation and Open Space Inventory (ROSI) with the New Jersey Green Acres Program. The parcels that are listed on the ROSI were documented in 2002 for Green Acres. In addition, an Open Space Inventory and Recreation and Conservation Plan Element was completed by the Borough in 2002. The General Open Space System Map is shown in Figure 16.

Parcels of land that have been purchased with Green Acres funding are regulated to specific types of recreational uses and development. The parcels of land within the Borough of Lindenwold that are restricted by the Green Acres program have been marked on the Lindenwold tax map and are listed on the following pages. A digital map specifically showing the ROSI lots has never been created.

Parcels that have been funded through the Green Acres Program are listed as funded, while parcels that have been purchased by the municipality with Green Acres are listed as unfunded. All parcels listed on the ROSI are encumbered by Green Acres regulations.

FIGURE 16 – OPEN SPACE SYSTEM MAP



SOURCE: NEW JERSEY 2002 ORTHOPHOTOS; TILES E14A1, D14B4



ENVIRONMENTAL RESOLUTIONS, INC.

ENGINEERS, SCIENTISTS & PLANNERS
525 FELLOWSHIP RD. SUITE 300
MOUNT LAUREL, NEW JERSEY 08054-1719
TEL. 856-235-7170 FAX 856-273-9239

0 500 1,000 2,000 3,000 4,000 Feet

GENERAL OPEN SPACE SYSTEM MAP

BOROUGH OF LINDENWOLD
CAMDEN COUNTY, NEW JERSEY

Lindenwold Environmental Commission

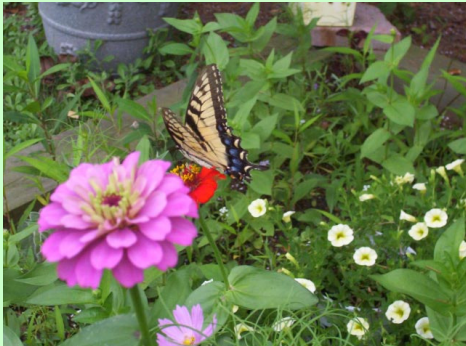


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LINDENWOLD BOROUGH

Table 7 Recreation and Open Space Inventory (ROSI)
Developed and Partially Developed Lands Held for Recreation and
Conservation Purposes

Key	Municipal Location Funded/Unfunded	Name	Block	Lot	Acre	
1	Holland St. & Walnut Ave.		26	2	0.69	Unfunded
2	Holland St. & Walnut Ave.		26	3	1.38	Unfunded
3	Emerson St. & Myrtle Ave.		83	1	3.44	Unfunded
4	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.07	0.14	Unfunded
5	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.08	0.14	Unfunded
6	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.09	0.14	Unfunded
7	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.11	0.14	Unfunded
8	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.13	0.14	Unfunded
9	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.15	0.14	Unfunded
10	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.16	0.14	Unfunded
11	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	123	1.18	0.14	Unfunded
12	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	124	12	0.57	Unfunded
13	W. Linden & Lincoln Ave.	Lincoln Avenue Playground	124	13	0.43	Unfunded
14	Park & 4 th	Park Ave. Field	176	1	0.199	Unfunded
15	Park & 4 th	Park Ave. Field	176	5	0.115	Unfunded
16	Park & 4 th	Park Ave. Field	176	12	0.7	Unfunded
17	Lake Blvd. & First	Boy Scouts Camp	181	10	0.83	Unfunded
18	Wright & Third	Wright Ave. Playground	192	17	1.2	Unfunded
19	Third & Columbia	Wright Ave. Playground	192	31	0.73	Unfunded
20	Wright & Third Ave.	Wright Ave. Playground	193	11	5.07	Unfunded
22	Aston-Martin Drive		238.11	16	0.33	Unfunded
23	United States Ave.	Lindenwold Park	244	11.02	5.18	Unfunded
24	United States Ave.	Lindenwold Park	244	11.03	11.83	Unfunded

Lindenwold Environmental Commission

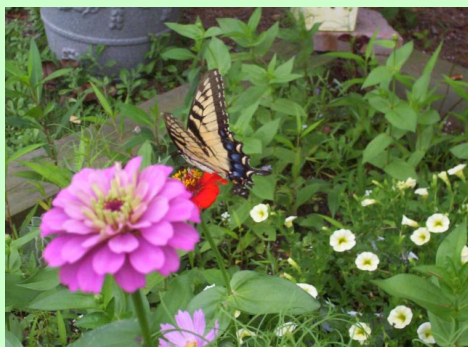


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25	United States Ave.	Lindenwold Park	244	11.04	2.345	Unfunded
26	United States Ave.	Lindenwold Park	244	11.05	7.31	Unfunded
27	United States Ave.	Lindenwold Park	245	1	1.2	Funded
28	United States Ave.	Lindenwold Park	246	1	3.9	Funded
29	United States Ave.	Lindenwold Park	247	1	4.8	Funded

Subtotal of Acres on this page 53.48
 Total Acres of developed and partially developed lands from all pages of this ROSI 70.98

Developed and Partially Developed Lands Held for Recreation and Conservation Purposes

Key	Municipal Location Funded/Unfunded	Name	Block	Lot	Acre	
1	United States Ave.	Lindenwold Park	248	1	3.6	Funded
2	United States Ave.	Lindenwold Park	248	2	2.56	
3	United States Ave.	Lindenwold Park	249	4	2.56	Funded
4	Egg Harbor Rd. & U. S. Ave.	Carlton Rouh Field	251	4	8.35	Unfunded *
5	U.S. Ave. & Winthrop		292	2.01	0.43	Unfunded

* Block 251 Lot 1 of the Carlton Rouh Field was funded but has been consolidated into Block 251, Lot. 4.

Subtotal of Acres on this page 17.5
 Total Acres of developed and partially developed lands from all pages of this ROSI 70.98

Wholly Undeveloped Lands Held for Recreation and Conservation Purposes

Key	Municipal Location Funded/Unfunded	Name	Block	Lot	Acre	
A.	Clementon Ave. & Grant	Wildlife Conservation	61	1	0.499	Funded
B.	Clementon Ave. & Grant	Wildlife Conservation	62	1.01	1.9	Funded

Lindenwold Environmental Commission

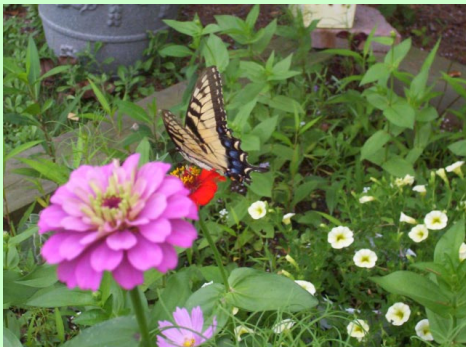


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LINDENWOLD BOROUGH

C.	Clementon Ave. & Grant	Wildlife Conservation	63	1	4.6	Funded
D.	Eisenhower Ave.	Wildlife Conservation	64	5	1.75	Funded
E.	Truman Ave.	Wildlife Conservation	65	6	1.63	Funded
F.	Truman Ave. & Jackson	Wildlife Conservation	66	5	0.115	Funded
G.	Columbia Ave. & RR ROW		168	4	1.59	Unfunded
H.	Columbia Ave. & RR ROW		168	5	1.61	Unfunded
I.	Columbia Ave. & RR ROW		168	6	1.263	Unfunded
J.	Columbia Ave. & RR ROW		168	6.01	0.791	Unfunded
K.	Laurel Rd. & Timber Creek	YWCA	238	1	10.5	
L.	United States Ave.		244	10	7.3	Funded
M.	US Ave. & Crystal Lake		296	1	1	Unfunded
N.	US Ave. & Crystal Lake		299	22	2.18	Unfunded

Subtotal of Acres on this page 36.73
 Total Acres of wholly undeveloped lands from all pages of this ROSI 36.73



Boy Scout Clean up Event, March 2008, Roach

Lindenwold Environmental Commission

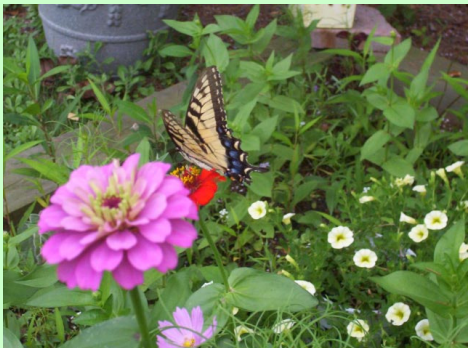


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LINDENWOLD BOROUGH

Although the General Open Space System Map does not show the open space lots encumbered by Green Acres restrictions, it does show the lots that are Camden County Parks, Borough Parks and Passive Open Space and Conservation Areas that will not have intense development. The largest open space areas are

- Camden County Park, west of Laurel Road, protects Big Timber Creek to Masons Creek
- Camden County Parks- east side of municipality- protects Lake Worth, flows to Silver Lake, Bottom Lake, and Big Timber Creek
- Lindenwold Park – United States Avenue – protects headwaters to Linden Lake, flows to Kirkwood Lake and Cooper River Watershed
- Camden County Open Space, south side of Kirkwood Lake, listed on ROSI

Lindenwold Environmental Commission

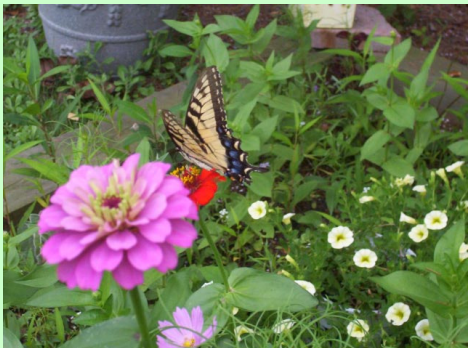


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LINDENWOLD BOROUGH

SECTION VI. SUMMARY

Lindenwold is a suburban community with rail transit links to Philadelphia and Atlantic City. The area now known as the Borough of Lindenwold was developed as a vacation spot for Philadelphians due to the lakes, streams and outdoor environment. The land was first developed around the lake areas into small lots for vacation homes. In the late 1960's, Lindenwold experienced a growth in multi-family housing units development when the PATCO speed line extended the high speed rail line from Philadelphia to Lindenwold. The Borough population has not increased since the 1970's.

Out of the 2,770 acres in the Borough, 100 acres are protected from development through the New Jersey Green Acres program. Three fifty acre parcels within the Borough adjacent to Kirkwood Lake, Mason Run and Lake Worth are the main areas of refuge to animal species that are listed as endangered, threatened, or priority species by the New Jersey Division of Fish, Game and Wildlife. The Borough remains committed to protecting the existing streams and lakes through the promotion of lake lowering, stream cleanings and education of residents and students in the Borough about the environmental conditions in Lindenwold.

Lindenwold Environmental Commission

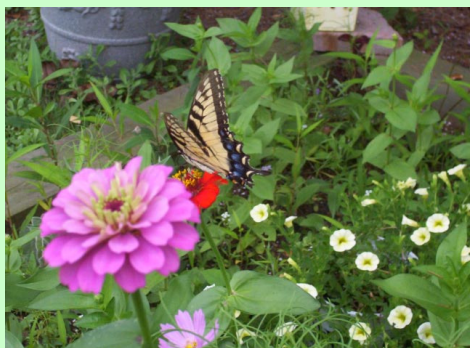


Photo of Lindenwold Library



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SECTION VII. REFERENCES

1. "The Environmental Resource Inventory: ERI." Association of New Jersey Environmental Commissions (ANJEC). 2004 update.
2. New Jersey Geologic Survey – NJDEP NJGS 1998 Geologic Maps
3. New Jersey Department of Environmental Protection (NJDEP)
<www.nj.gov/dep>
4. New Jersey Municipal Land Use, <www.nj.gov/landuse/fww.html>
5. Camden County Municipal Utilities Authority, <www.ccmua.org>
6. Shaylor, Charles W. "History of Lindenwold" 1989
7. "A History of Commitment." Port Authority Transit Corporation. 2010 <www.ridestatco.org>